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Table of Contents.

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ORIGINAL ARTICLES— Page.
Final Observations on Congenital Defects in Infants following Infectious Diseases during Pregnancy, with Special Reference to Rubella, by Charles Swan, A. L. Tostevin and G. H. Barham Black 889

REVIEWS—
Introduction to Biochemistry 908
The Feeding of Infants 908

NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—
Short Stories of the War 908
Australia in World Affairs 908

LEADING ARTICLES—
The School Medical Services of Australia 909

CURRENT COMMENT—
Vitamin Deficiency in Pernicious Anæmia 910
Tetanus from Infected Talc 911
Dental Surgeons and Medical Practitioners: A Matter of Responsibility 911
The Retirement of Dr. N. G. Horner 911

ABSTRACTS FROM MEDICAL LITERATURE—
Pædiatrics 912
Orthopædic Surgery 913

BRITISH MEDICAL ASSOCIATION NEWS—
Notice 914

PUBLIC HEALTH— Page.
The Medical Examination of School Children 914
Psychological Problems in School Children 915

NAVAL, MILITARY AND AIR FORCE—
Appointments 917

CORRESPONDENCE—
Lumbago 917
The Treatment of Burns 918
Motor-Car Allowance for the Locum Tenens 918

OBITUARY—
Augustus Leo Kenny 918
William Roy Wilson 919
Stewart Osburn Cowen 919
Albert Arscott Pain 919
James Adolph Gruen 919

THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS—
Primary Fellowship Examination 920

AUSTRALIAN MEDICAL BOARD PROCEEDINGS—
New South Wales 920

NOMINATIONS AND ELECTIONS 920

BOOKS RECEIVED 920

MEDICAL APPOINTMENTS: IMPORTANT NOTICE .. 920

EDITORIAL NOTICES 920

FINAL OBSERVATIONS ON CONGENITAL DEFECTS IN INFANTS FOLLOWING INFECTIOUS DISEASES DURING PREGNANCY, WITH SPECIAL REFERENCE TO RUBELLA.

By CHARLES SWAN,[1] A. L. TOSTEVIN and G. H. BARHAM BLACK,

From the Department of Pathology, University of Adelaide, and the Institute of Medical and Veterinary Science, Adelaide, South Australia.

IN 1941, Gregg,[1] of New South Wales, discovered the relationship between maternal rubella in pregnancy and certain congenital malformations in the infant born subsequently. In the following year, with the aim of confirming and extending Gregg's observations, a team of which we were members began research in South Australia. The results of these investigations have been published in a series of articles.[2][3][4][5][6][7] The paper last mentioned contains a review of the literature. Additional communications include those of Adams,[8] Bull,[9] Long and Danielson,[10] De Roetth and Greene,[11] Albaugh,[12] Conte McCammon and Christie,[13] Fox and Bortin,[14] Martin,[15] Hall,[16] Parsons,[17] Bower[18] and Winterbotham.[19]

The objects of the present paper are: (i) to record the results of restudy of two earlier series of cases of congenital defect subsequent to maternal rubella in pregnancy; (ii) to report a fourth series of cases; and (iii) to summarize the results of the South Australian investigations carried out during the last five years.

The plan of the investigation was that drawn up earlier.[5][6] Under the ægis of the National Health and Medical Research Council, one of us (C.S.) undertook general charge of the inquiry, interviewed all the mothers, carried out the routine physical examinations of the children, and collected and correlated the data. In addition, as in the preceding articles of the series, he compiled and arranged the paper, and as before was solely responsible for the discussion, for the conclusions drawn and for the hypotheses therein propounded. One of us (A.L.T.) examined the ears of the children and shared with another of us (G.H.B.B.) the ophthalmological portion of the work. The latter was responsible also for the additional new observations on the eyes in Case 15. The X-ray examinations were performed at the Adelaide Children's Hospital by Dr. Colin Gurner and Dr. Creagh Smeaton, assisted by Mr. B. G. Compton, to all of whom we are much indebted.

[1] Working with grants from the National Health and Medical Research Council, Australia, and from the Keith Sheridan Research Fund of the University of Adelaide.

A RESURVEY OF TWO PREVIOUS SERIES OF CHILDREN WHOSE MOTHERS SUFFERED FROM RUBELLA IN PREGNANCY.

When they were first examined, some of the children of our first and second series of cases[2][3] were very young. Consequently we anticipated that as they grew older they might exhibit other abnormalities. In the course of the succeeding two years it became evident that several of the children were deaf and that another child, previously diagnosed as suffering from a cardiac defect, was normal. Accordingly, with the object of confirming our earlier observations and of ascertaining whether further defects had developed in any of the other children of these two series, we decided to reexamine them. At the same time we took advantage of the opportunity to gather additional information and to trace each child's physical progress. Assessment of the mental development was undertaken by Miss Mary Smith. Her findings will be recorded in a separate paper.[20]

Period of Pregnancy at which Rubella Occurred.

As we have recently pointed out,[7] estimates of the period of pregnancy at which the mother developed German measles are liable to certain errors. For instance,

some mothers calculate the duration of gestation from the first day of the last menstrual period, others from the last day, and a few from the seventh day after the beginning of the last menstrual period.

We have endeavoured to determine more precisely the stage of pregnancy at the time of the development of rubella, assuming that fertilization occurred fourteen days after the commencement of the last menstrual period. Sometimes the mother was able to furnish the date of both the last menstrual period and the onset of the exanthem. On other occasions the dates were remembered by members of the family or were available in the records of medical attendants. We were thus enabled to check our previous estimates in 28 of the original 61 cases (Table I). In only six instances (Cases 27, 37, 38, 40, 42 and 47) were the original findings confirmed. In 18 cases the earlier estimates of the period of gestation were found to be excessive; among these were Case 35 (one to two and a half months in excess), Case 26 (one and a half months), Cases 14 and 23 (three weeks), Cases 2, 3, 11 and 20 (two weeks), Case 15 (up to two weeks), Case 4 (ten days) and Cases 1, 19, 29, 31, 33, 34, 64 and 65 (one week). In the remaining four cases (Cases 36, 45, 72 and 73) it was found that we had originally under-estimated the duration of pregnancy by one week.

Results of Reexamination of the Children.

Number of Children Reexamined.

In the combined series of 61 cases it was possible to reexamine 49 children (Table I). In the remaining 12 cases nine of the patients had died (Cases 6, 7, 9, 11, 17, 24, 25, 45 and 70). In Case 49 the child could not be traced. In two instances (Cases 3 and 73) the parents would not cooperate in reexamination. In Case 9 an autopsy disclosed additional anomalies—namely, right cryptorchidism and hydrocele.

Subjects Previously Diagnosed as Normal.

In seven of the 17 cases comprising the series (Cases 31, 36, 37, 39, 40, 42 and 46) the earlier diagnosis was confirmed. (It should be noted, however, that in Case 31 examination was incomplete, as further radiography was refused.)

Reexamination of the remaining ten patients disclosed abnormalities. The defects included heart disease (Cases 29, 33, 44 and 72), microcephaly (Cases 32, 33, 34, 47 and 72), mongolism (Case 43), an azygous lobe of the right lung (Case 38) and left-sided Horner's syndrome and hemiparesis (Case 48). In addition, in Case 33 fusion of the upper ends of the right radius and ulna was found.

Clinically the cardio-vascular system in Cases 29, 33, 44 and 72 appeared to be normal; diagnosis was based on radiological findings only. The X-ray findings were as follows. In Case 29 the mediastinum was not widened, but the transverse diameter of the heart was slightly increased and the outline globular. In Case 33 the cardiac outline was enlarged and increased vascular markings were present in the lungs, suggesting a congenital defect. In Case 44 the transverse diameter of the heart was increased, the appearance suggesting a congenital abnormality. In Case 72 the transverse diameter of the heart was increased and the appearance suggested a congenital abnormality.

The microcephaly was only slight in degree, the variations from normal ranging from 0·4 to 0·7 inch. (Variations of 0·3 inch or less were disregarded.)

We have not previously encountered an azygous lobe of the lung (Case 38) as a malformation in association with rubella in pregnancy. It is almost certain that the relationship was purely a chance one. The occurrence of fusion of the radius and ulna in Case 33 might have been interpreted similarly, were it not for the presence in this instance of other abnormalities commonly associated with rubella.

In Case 48 the defects were the result of birth injury.

Subjects Previously Diagnosed as Congenitally Defective.

The series consisted of 32 cases, which could be divided into four groups.

The first group was formed by 14 cases (Cases 4, 10, 12, 14, 19, 20, 21, 26, 28, 35, 41, 65, 66 and 67), in which the original findings were confirmed.

The second group comprised three cases. In two of them the defects diagnosed earlier—namely, microcephaly (Case 18) and heart disease (Case 30)—could no longer be detected. In the remaining instance (Case 16), although bilateral cataract and microcephaly were still present, evidence of heart disease was doubtful.

The third group was composed of 12 cases in which additional abnormalities were detected. The defects included two certain (Cases 63 and 68) and one probable (Case 23) instances of deaf-mutism. Heart disease was definitely found in Case 27 and possibly present in Case 62. Three children (Cases 5, 8 and 22) had a high-arched palate; in addition, in Case 8 the child was mentally deficient and the lower third of her sternum was bifid, while in Case 22 the child suffered from bilateral optic atrophy with gross central visual defect, and from epilepsy. In one case (Case 64) microcephaly and in another (Case 71) left-sided inguinal hernia and cryptorchidism were evident. In one instance (Case 13) definite and in another (Case 15) probable *spina bifida occulta* were present; further anomalies in Case 15 were bilateral cryptorchidism and a left inguinal hernia.

The fourth group consisted of three cases in which an earlier abnormality had either disappeared or was doubtful, its place being taken by another defect. In Case 1 heart disease and in Case 2 mental deficiency had been replaced by deaf-mutism and cryptorchidism respectively. In Case 69 slight microcephaly was detectable, but evidence of heart disease was doubtful.

Additional Ophthalmological Observations.

In Case 15, on examination of the child at the age of three years and nine months, the cataract (left eye) was unchanged. Three months later the child was admitted to the Adelaide Children's Hospital with a history of two attacks of pain in and redness of his left eye; the question of their being due to glaucoma was raised. However, the eye was quiet and its tension was normal. Some keratic precipitates were noted. The iris was tremulous. The cataract had the appearance of the Morgagnian type. Further examination was carried out when the boy had reached the age of five years and one month. Nystagmus was still present in both eyes. Under general anæsthesia it was found that the keratic precipitates in the left eye had disappeared and that posterior synechiæ had formed on the nasal side between the iris and lens. The lens was represented by a hollow capsule containing small scattered opacities. Details of the *fundus oculi* were not visible. The cataract had disappeared spontaneously, evidently by rupture of the capsule without operation. The attacks of pain *et cetera* in the eye and the earlier keratic precipitates were thus explained. In the right (non-cataractous) eye the media were clear. Examination of the *fundus oculi* at the macula revealed irregularity of pigment, while near the macula there was a small aggregation of whitish chorioidal spots. The macular lesion was considered to account satisfactorily for the nystagmus in that eye.

Among the congenital abnormalities exhibited by the child in Case 2 were bilateral cataracts. This condition had been treated by discission commencing at the age of three months. A test, undertaken when the patient was three years and seven months old, disclosed that he could name most common objects correctly and that he could differentiate with ease between various colours.

Physical Development of the Children.

All mothers were asked to trace the progress of their children from birth, emphasis being laid upon the age at which certain milestones were passed. These milestones included (i) the ability to assume the sitting position unaided, (ii) the ability to walk, and (iii) the ability to control micturition and defæcation (Table I).

Ability to Assume the Sitting Position Unaided.—The normal standard adopted for ability to assume the sitting position unaided was from nine to ten months. Seventeen

TABLE I.

Analysis of Data Obtained on Reexamination of Children whose Mothers Suffered from Rubella in Pregnancy.

Case No.	Number of Months Pregnant at Onset of Rubella.		Age of Child at Time of Reexamination. (Years and Months.)	Sex of Child.	Age at which Child was Able to Assume Sitting Position Unaided. (Normal, 9 to 10 Months.)	Age at which Child Walked. (Normal, 12 to 18 Months.)	Age at which Child had Control over Micturition and Defæcation.	Weight (Pounds); Normal Measurement for Age and Sex in Parentheses.	Height (Inches); Normal Measurement for Age and Sex in Parentheses.	Circumference of Skull (Inches); Normal Measurement For Age and Sex in Parentheses.	Congenital Defects Observed at Original Examination.	Congenital Defects Observed on Reexamination.	Remarks.
	Original Estimate.	Revised Estimate.											
1	Not more than ¼	¼[1]	3 9	F.	24	Cannot walk, able to hold herself up by the cot at age of 3 years.	No control.	23 (33·3)	37 (38·8)	17·1 (19·4)	Bilateral cataract, heart disease, probable mental deficiency.	Bilateral cataract, deaf-mutism, definite mental deficiency, no evidence of heart disease.	
2	¼	¼[1]	2 6	M.	9	26	No control.	22 (29·5)	33 (35·3)	17·8 (19·5)	Bilateral cataract, heart disease. Probable mental deficiency.	Bilateral cataract, heart disease, cryptorchidism. No evidence of mental deficiency.	
3	¼	¼[1]		M.							Hypospadias.		Further examination not permitted.
4	¼	¼[1]	4 6	F.	18	27	3½ years.	29 (37·0)	40 (41·0)	18·9 (19·5)	Left-sided cataract. Heart disease.	As before.	*Ductus arteriosus* successfully ligated at age of 3½ years (see McKay[11]).
5	1	1	5 2	F.	9 to 10	18	1½ to 2 years.	34 (40·6)	42 (42·8)	18·4 (19·5)	Deaf-mutism, heart disease.	As before, with high arched palate.	
6	1	1		M.							Bilateral cataract, heart disease.		Died at age of 7 weeks. Post-mortem examination not permitted.
7	1	1		M.							Bilateral cataract.		Died at age of 4 months from "bronchial trouble". No autopsy performed.
8	? 1	? 1	2 11	F.		30 (able to walk around playground earlier).	No control.	28 (30·6)	37 (36·2)	18·0 (19·4)	Bilateral cataract.	As before, with mental deficiency, high arched palate, bifid lower third of sternum.	
9	1–1½	1–1½		M.							Bilateral cataract.	As before, with right cryptorchidism and hydrocele.	Died at age of 2½ months from bronchopneumonia, subsequent to morbilli. Post-mortem examination showed cataract, right cryptorchidism and hydrocele, moderate nutmeg liver, but no apparent heart disease.
10	? 1½	? 1½	4 6	F.		16	18 months.	33 (37·0)	42 (41·0)	19·1 (19·5)	Heart disease.	As before.	
11	1½	1[1]		F.							Heart disease.		Died at age of 3 weeks from bronchopneumonia and cardiac defect. Post-mortem examination, see Swan.[6]
12	? 1½	? 1½	4 7	M.	10	15		34 (37·5)	41·5 (41·0)	19·9 (19·9)	Deaf-mutism.	As before.	
13	? 1½	? 1½	3 4	M.	14	18	2 years.	25 (32·7)	36 (37·7)	18·8 (19·8)	Heart disease.	As before, with *spina bifida occulta*.	

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

TABLE I.—*Continued.*

Analysis of Data Obtained on Reexamination of Children whose Mothers Suffered from Rubella in Pregnancy.—Continued.

Case No.	Number of Months Pregnant at Onset of Rubella.		Age of Child at Time of Reexamination. (Years and Months.)	Sex of Child.	Age at which Child was Able to Assume Sitting Position Unaided. (Normal, 9 to 10 Months.)	Age at which Child Walked. (Normal, 12 to 18 Months.)	Age at which Child had Control over Micturition and Defæcation.	Weight (Pounds); Normal Measurement for Age and Sex in Parentheses.	Height (Inches); Normal Measurement for Age and Sex in Parentheses.	Circumference of Skull (Inches); Normal Measurement For Age and Sex in Parentheses.	Congenital Defects Observed at Original Examination.	Congenital Defects Observed on Reexamination.	Remarks.
	Original Estimate.	Revised Estimate.											
14	1½	1[1]	3 11	F.	7	15	18 to 19	37 (33·8)	40 (39·3)	19·1 (19·5)	Deaf-mutism.	As before.	
15	1½ to 2	1½[1]	3 10	M.	12	27	3½ years	26 (33·7)	37 (38·7)	18·4 (19·8)	Left-sided cataract, *talipes equinovarus*, heart disease.	As before, with cryptorchidism, left inguinal hernia and probable *spina bifida occulta*.	
16	Probably less than 2	Probably less than 2	2 7	F.	9	24	Still has occasional enuresis.	30 (28·9)	39·5 (35·9)	18·5 (19·0)	Bilateral cataract, heart disease.	As before, but evidence of heart disease now doubtful.	
17	2	2		F.	18	38	18	22 (32·3)			Bilateral buphthalmos, heart disease, probable mental deficiency.		Died in convulsions at age of 3 years 5 months before reexamination had been undertaken. No evidence to suggest any further abnormality. Autopsy not permitted.
18	2	2	1 9	M.	9	12	14	29 (25·8)	34 (32·5)	19·6 (18·9)	Microcephaly.	No evidence of microcephaly or of any other defect.	
19	2	1½[1]	4 9	F.	8	13	Control present.	42 (38·5)	42 (41·8)	19·5 (19·5)	Deaf-mutism.	As before.	
20	2	1½[1]	2 1	M.		21	Still has enuresis.	21·5 (27·4)		18·0 (19·2)	Heart disease.	As before.	
21	? 2	? 2	3 10	F.	8	14	24	25 (33·5)	37 (39·0)	18·5 (19·5)	Deaf-mutism, heart disease.	As before.	
22	? 2	? 2	2 7	F.	Still not able to sit up.	Has never walked.	No control.		35 (35·0)	17·5 (19·1)	Microcephaly, mentally retarded.	As before, with bilateral optic atrophy, epilepsy, high arched palate.	
23	? 2	1½[1]	2 0	M.	19	Unable to walk without holding on to objects for support.	No control.	18 (27·0)	29·5 (33·5)	17·9 (19·2)	Heart disease.	As before, with probable deaf-mutism.	
24	? 2	? 2		M.							Bilateral cataract, heart disease.		Died at age of 2½ months from cardiac defect. Post-mortem examination performed (Swan[41]).
25	? 2	? 2		F.							Left-sided cataract, heart disease.		Died at age of 1 month from cardiac condition and bronchopneumonia. Post-mortem examination performed (Swan[41]).
26	2½	½[1]	3 0	F.	12	18	24	22 (31·0)	34 (36·5)	17·8 (19·4)	Bilateral cataract.	As before.	
27	2½	2½[1]	4 10	M.	6	12	2½ years.	31 (39·0)	39 (41·9)	19·5 (19·9)	Deaf-mutism.	As before, with heart disease.	
28	3	3	5 0	F.	9	17	24	34 (40·0)	42·8 (42·5)	18·5 (19·5)	Bilateral cataract.	As before.	

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

TABLE I.—*Continued.*

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

TABLE I.—*Continued.*

Analysis of Data Obtained on Reexamination of Children whose Mothers Suffered from Rubella in Pregnancy.—Continued.

Case No.	Number of Months Pregnant at Onset of Rubella.		Age of Child at Time of Reexamination. (Years and Months.)	Sex of Child	Age at which Child was Able to Assume Sitting Position Unaided. (Normal, 9 to 10 Months.)	Age at which Child Walked. (Normal, 12 to 18 Months.)	Age at which Child had Control over Micturition and Defæcation.	Weight (Pounds); Normal Measurement for Age and Sex in Parentheses.	Height (Inches); Normal Measurement for Age and Sex in Parentheses.	Circumference of Skull (Inches); Normal Measurement For Age and Sex in Parentheses.	Congenital Defects Observed at Original Examination.	Congenital Defects Observed on Reexamination.	Remarks.
	Original Estimate.	Revised Estimate.											
29	3	2½[1]	2 3	M.	6	11	18	31 (28·3)	36 (34·4)	20·0 (19·4)		Heart disease.	
30	3	3	2 6	M.	4½	8	Occasional enuresis.		36 (35·3)	19·6 (19·5)	Heart disease.	No evidence of heart disease.	
31	3	2½[1]	2 4	F.	6	12	15	? 28 (27·7)	34 (34·2)	19·3 (18·8)		As before.	Further X-ray examination of heart not permitted.
32	3	3	2 9	F.	9	18	18			18·5 (19·2)		Microcephaly.	
33	3	2½[1]	3 1	M.		16	24	29 (32·2)	39·5 (37·2)	19·1 (19·8)		Heart disease, microcephaly, fusion of the upper ends of the right radius and ulna.	
34	3½	3½[1]	2 3	F.		15	18	23 (27·3)	33·5 (33·9)	18·4 (18·8)		Microcephaly.	
35	? 3½ to 5	2½[1]	4 5	F.	7	12	2½ years.	4 (36·5)	40·5 (40·8)	19·3 (19·5)	Deaf-mutism.	As before.	
36	4	4½[1]	2 5	F.	9	13	18	3 (28 1)	35 (34·5)	19·6 (19·0)		As before.	
37	4½	4½[1]	3 6	F.	9	11	Control present.	32 (32·5)	39 (38·0)	20·0 (19·5)		As before.	
38	4½	4½[1]	2 7	M.		12	Still has nocturnal enuresis.	35 (29·9)	37 (35·5)	20·6 (19·6)		Small azygous lobe of right lung.	
39	5	5	2 8	F.	10	14	24	30 (29·9)	35 (35·3)	19·0 (19·1)		As before.	
40	5½	5½[1]	2 6	F.	10	18	24	31 (28·5)	35·5 (34·8)	20·0 (19·0)		As before.	
41	5½ to 6	5½ to 6	2 9	M.	9	13	18	31 (30·8)	37 (36·1)	18·5 (19·6)	Microcephaly.	As before.	
42	6	6[1]	2 10	F.	8	18	Control present.	30 (30·2)	37 (35·9)	19·0 (19·2)		As before.	
43	? 6	5 to 6	2 11	M.	13	Still unable to walk. Able to stand since 2½ years.	No control.	25 (31·6)	32·5 (36·7)	18·8 (19·7)		Mongolism.	
44	6 to 7	6 to 7	3 0	F.	10	14	14	37 (31·0)	38·5 (36·5)	20·0 (19·4)		Heart disease.	
45	7	7½[1]		M.									Died at age of 1 week from bronchopneumonia. Born 1½ months prematurely.
46	7	7	2 9	F.	9 to 10	12½	Control present.	32 (29·8)	36 (35·6)	19·0 (19·2)		As before.	

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

TABLE I.—*Continued.*

Analysis of Data Obtained on Reexamination of Children whose Mothers Suffered from Rubella in Pregnancy.—Continued.

Case No.	Number of Months Pregnant at Onset of Rubella.		Age of Child at Time of Reexamination. (Years and Months.)	Sex of Child.	Age at which Child was Able to Assume Sitting Position Unaided. (Normal, 9 to 10 Months.)	Age at which Child Walked. (Normal, 12 to 18 Months.)	Age at which Child had Control over Micturition and Defæcation.	Weight (Pounds); Normal Measurement for Age and Sex in Parentheses.	Height (Inches); Normal Measurement for Age and Sex in Parentheses.	Circumference of Skull (Inches); Normal Measurement For Age and Sex in Parentheses.	Congenital Defects Observed at Original Examination.	Congenital Defects Observed on Reexamination.	Remarks.
	Original Estimate.	Revised Estimate.											
47	8	8[1]	2 11	M.		11	18	31 (31·6)	37·3 (36·7)	19·0 (19·7)		Microcephaly.	
48	8½	8½	2 11	F.	12	15	18	31 (30·6)	37·5 (36·2)	19·8 (19·3)		Left-sided Horner's syndrome. Left-sided hemiparesis.	Birth injury. Child born while mother was sitting on a commode.
49	9	9											Reexamination could not be performed; child had gone interstate and could not be traced.
62	"Early in pregnancy"	As before.	5 7	M.	8	17	24	38 (42·9)	42·5 (43·7)	20·3 (20·0)	Deaf-mutism.	As before, with possible heart disease.	
63	½ to ¾	½ to ¾	2 8	M.	16	25	No control.	21 (30·3)	33 (35·8)	18·3 (19·6)	Heart disease.	As before, with deaf-mutism.	
64	¾	¾[1]	2 6	F.	9	17	24	27·5 (28·5)	36 (34·8)	17·9 (19·0)	Left-sided cataract.	As before, with microcephaly.	
65	1	¾[1]	2 5	F.	18	Has never walked unaided. Able to walk holding on to side of cot since age of 21 months.	No control.	21·5 (28·1)		17·0 (18·9)	Bilateral cataract, heart disease.	As before.	
66	1½ to 2	1½ to 2	5 6	M.	8	14½	24	38 (42·5)	44·5 (43·5)	19·3 (20·0)	Deaf-mutism.	As before.	
67	1½ to 2	1½ to 2	4 4	F.	8½	14	36 Nocturnal enuresis.	34 (36·0)	42 (40·5)	19·3 (19·4)	Deaf-mutism.	As before.	
68	2 to 2½	2 to 2½	2 6	M.	12	18	No control.	18 (29·5)	31 (35·3)	17·1 (19·5)	Heart disease.	As before, with deaf-mutism.	
69	2½	2½	5 7	M.	8 to 9	13	36 Nocturnal enuresis up to 4½ years.	34 (42·9)	42 (43·7)	19·5 (20·0)	Deaf-mutism, heart disease.	Deaf-mutism, evidence of heart disease doubtful, microcephaly.	
70	3½			F.							Obliteration of bile ducts.		Died at age of 10 months from obliteration of bile ducts.
71	? 4	? 4	5 1	M.	9 to 10	18	18	38 (40·4)	43·5 (42·7)	20·0 (20·0)	Deaf-mutism.	As before, with left inguinal hernia and cryptorchidism.	
72	6	6½[1]	2 6	F.	10	13	27	25 (28·5)	36 (34·8)	18·5 (19·0)		Heart disease, microcephaly.	
73	6	6½[1]		M.									Child adopted; further examination not permitted.

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

infants conformed to this standard; of these, 11 (Cases 2, 5, 12, 16, 28, 32, 41, 44, 64, 71 and 72) had congenital defects and the remainder (Cases 18, 36, 37, 39, 40 and 46) were normal. In 13 instances the babies sat up at an earlier age than usual, including one (Case 30) at four and a half months, three (Cases 27, 29 and 31) at six months, two (Cases 14 and 35) at seven months, five (Cases 19, 21, 42, 62 and 66) at eight months, and two (Cases 67 and 69) at between eight and nine months. Of these children only two (Cases 30 and 31) were free from abnormalities. In 13 cases there was delay in sitting up; four infants (Cases 15, 26, 48 and 68) sat up at the age of twelve months, one (Case 43) at thirteen months, one (Case 13) at fourteen months, one (Case 63) at sixteen months, three (Cases 4, 17 and 65) at eighteen months, one (Case 23) at nineteen months, and one (Case 1) at twenty-four months. When last examined at the age of two years and seven months, one child (Case 22) was still unable to sit up. All the 13 children had congenital defects.

Age at which the Child was Able to Walk.—The normal standard adopted for walking was from twelve to eighteen months. In 33 instances (Cases 5, 10, 12, 13, 14, 18, 19, 21, 26, 27, 28, 31, 32, 33, 34, 35, 36, 38, 39, 40, 41, 42, 44, 46, 48, 62, 64, 66, 67, 68, 69, 71 and 72) the age at which the child walked was within normal limits. All except seven of these subjects (Cases 18, 31, 36, 39, 40, 42 and 46) exhibited congenital malformations. Four children were able to walk before their first birthday, one (Case 30) at eight months and three (Cases 29, 37 and 47) at eleven months. Two of these patients (Cases 30 and 37) were normal. In 13 cases there was delay in walking. One baby (Case 20) walked at twenty-one months, one (Case 16) at twenty-four months, one (Case 63) at twenty-five months, one (Case 2) at twenty-six months, two (Cases 4 and 15) at twenty-seven months, one (Case 8) at thirty months, and one (Case 17) at thirty-eight months. In five instances at the time of examination the children were unable to walk; their respective ages were two years (Case 23), two years and five months (Case 65), two years and seven months (Case 22), two years and eleven months (Case 43) and three years and nine months (Case 1). However, with the exception of the child in Case 22, all these five patients were able to stand up by holding on to the side of the cot. All the 13 children were congenitally defective.

Control of Micturition and Defæcation.—The upper limit of normal for control of micturition and defæcation was arbitrarily defined as two years. Control was gained at between fourteen and eighteen months by 13 children (Cases 10, 17, 18, 29, 31, 32, 34, 36, 41, 44, 47, 48 and 71), and at between nineteen and twenty-four months by 12 children (Cases 5, 13, 14, 21, 26, 28, 33, 39, 40, 62, 64 and 66). Only four of these patients (Cases 18, 31, 36 and 40) were normal. Nine subjects (Cases 16, 20, 27, 30, 35, 38, 67, 69 and 72) gained control at between two and three years. However, all except three of them (Cases 27, 35 and 72) suffered occasionally from enuresis, usually nocturnal. Two children (Cases 4 and 15) obtained control at three and a half years. In four cases (Cases 19, 37, 42 and 46) control was present, but the exact time at which it was gained was not known. At the time of examination nine patients had no control; four of them (Cases 2, 23, 65 and 68) were aged between two and two and a half years, and four (Cases 8, 22, 43 and 63) were aged between two years and seven months and two years and eleven months. One (Case 1) was aged three years and nine months. Of the 20 patients in whom control was delayed or absent, only one (Case 30) was free from abnormalities.

Weight.—In 28 instances the children weighed less than normal. One (Case 68) was between 11·1 and 12·0 pounds underweight, two (Cases 1 and 17) were between 10·1 and 11·0 pounds underweight, one (Case 63) was between 9·1 and 10·0 pounds underweight, four (Cases 21, 23, 26 and 69) were between 8·1 and 9·0 pounds underweight, five (Cases 2, 4, 13, 15 and 27) were between 7·1 and 8·0 pounds underweight, three (Cases 5, 43 and 65) were between 6·1 and 7·0 pounds underweight, two (Cases 20 and 28) were between 5·1 and 6·0 pounds underweight, three (Cases 34, 62 and 66) were between 4·1 and 5·0 pounds underweight, three (Cases 10, 12 and 72) were between 3·1 and 4·0 pounds underweight, two (Cases 8 and 71) were between 2·1 and 3·0 pounds underweight, and two (Cases 64 and 67) were between 1·0 and 2·0 pounds underweight. (Variations of less than 1·0 pound were disregarded.) According to Tallerman and Rose,[139] for practical purposes a variation of up to 20% from the average standard of weight may be considered to be within normal limits. On this basis 16 children (Cases 1, 2, 4, 13, 15, 17, 20, 21, 23, 26, 27, 43, 63, 65, 68 and 69) were underweight and none was overweight. In five instances (Cases 1, 17, 23, 63 and 68) the children were only approximately two-thirds of the normal weight for their respective ages and sexes. It is noteworthy that of the 16 children mentioned above who were underweight, all suffered from congenital abnormalities.

Height.—Fifteen patients were of less than normal height; two (Cases 43 and 68) were approximately 4·2 inches shorter than average, one (Case 23) was between 3·1 and 4·0 inches shorter, four (Cases 2, 26, 27 and 63) were between 2·1 and 3·0 inches shorter, six (Cases 1, 13, 15, 21, 62 and 69) were between 1·1 and 2·0 inches shorter and two (Cases 4 and 5) were between 0·5 and 1·0 inch shorter. (Variations of less than 0·5 inch were disregarded.) Of the 23 children who were above standard height, one (Case 16) measured 4·5 inches more than average, one (Case 33) between 2·1 and 3·0 inches more, nine (Cases 18, 29, 38, 42, 44, 48, 64, 67 and 72) between 1·1 and 2·0 inches more, and 12 (Cases 8, 10, 12, 14, 30, 36, 37, 40, 41, 47, 66 and 71) between 0·5 and 1·0 inch more. Tallerman and Rose[139] consider that variations of up to 6% from accepted average standards of height are not significant. From this viewpoint seven children (Cases 2, 23, 26, 27, 43, 63 and 68) were shorter and two (Cases 16 and 33) taller than normal. All these subjects suffered from congenital malformations.

Cyanosis.—As babies, two children (Cases 48 and 65) had had a few attacks of "blueness", attributed by their respective mothers to "too much excitement". Three mothers (Cases 1, 43 and 68) had noted blueness of their children's hands and feet on cold days, but this condition had improved once the babies were able to stand up. Transient cyanosis was observed in Cases 31 and 37 when the children contracted pyelitis and whooping-cough respectively. Only two of these infants (Cases 65 and 68) had cardiac disease.

Difficulties in Feeding.—In 20 instances (Cases 1, 2, 14, 15, 16, 22, 23, 29, 33, 34, 35, 41, 43, 46, 48, 63, 64, 67, 68 and 69) the mothers complained that their babies were difficult to feed. For the most part these difficulties were greatest in the early months after birth and disappeared as the children grew older. Occasionally (Cases 1, 2, 16, 22, 63 and 64) further trouble was experienced when attempts were made to introduce solid foods into the diet. With one exception (Case 46) all the infants were congenitally abnormal.

Infectious Diseases Contracted by the Children.—Eight children (Cases 4, 5, 34, 37, 40, 43, 47 and 65) had suffered from chickenpox, eight (Cases 12, 13, 14, 19, 23, 48, 63 and 69) from morbilli, one (Case 36) from rubella, two (Cases 19 and 69) from mumps, and nine (Cases 12, 15, 16, 23, 35, 37, 47, 48 and 69) from whooping-cough.

Position of the Children in their Respective Families.—In 28 instances (Cases 1, 2, 5, 7, 10, 13, 14, 15, 17, 18, 21, 22, 26, 27, 29, 34, 35, 38, 39, 40, 41, 42, 44, 46, 62, 64, 66 and 73) the babies were the first children; in 11 instances (Cases 4, 23, 28, 32, 36, 63, 65, 67, 69, 71 and 72) they were the second children; and in 12 instances (Cases 8, 12, 16, 19, 20, 30, 31, 33, 37, 43, 47 and 48) they were the third children. One patient (Case 68) was the fourth child.

Additional Information.

Number of Infants Subsequently Borne by the Mothers.

Thirty-two mothers (Cases 1, 2, 3, 5, 8, 14, 16, 18, 19, 20, 22, 26, 28, 29, 31, 32, 36, 37, 38, 39, 40, 42, 43, 47, 48, 62,

[1] Duration of pregnancy calculated from fourteenth day after onset of last menstrual period.

63, 64, 67, 68, 69 and 72) had had no children since the affected child; 13 (Cases 10, 12, 13, 15, 17, 21, 23, 33, 34, 35, 41, 46 and 65) had had one child since; and three (Cases 27, 66 and 71) had had two children since. Only one of these 19 babies (Case 15) had a congenital defect (*talipes valgus*).

Miscarriages.

Five mothers had had miscarriages before the pregnancy in which they had contracted German measles; of these, four (Cases 22, 26, 34 and 46) had had one miscarriage and one (Case 32) had had two. One mother (Case 20) had had a miscarriage before and another after the pregnancy in which she had suffered from rubella. Five mothers (Cases 4, 39, 42, 47 and 64) had had a miscarriage subsequent to the pregnancy in which they had suffered from German measles.

RESULTS OF STUDY OF A FOURTH SERIES OF CASES OF CONGENITAL MALFORMATION IN INFANTS FOLLOWING INFECTIOUS DISEASES DURING PREGNANCY.

The fourth series consisted of 25 cases (Table II). In 17 instances (one, Case 136, doubtful) the mother had suffered from rubella during pregnancy. In one instance (Case 138) the mother had contracted varicella as well. In the remaining eight cases the mother had suffered from other infectious diseases during pregnancy, including morbilli (three cases), mumps (two cases), scarlet fever (one case), "rheumatic influenza" (one case) and a pustular rash, nature not determined (one case).

Rubella During Pregnancy and Congenital Defects.

Geographical Distribution.

With the exception of four cases, at the time when they suffered from German measles all the mothers lived in South Australia, eight in the metropolitan area of Adelaide and five in country districts. In the remaining cases three mothers lived in Victoria and one in New South Wales.

Annual Incidence of Cases.

In four cases the exanthem occurred in 1939, in four in 1940, in three in 1941, in four in 1942 and in two in 1945.

Nature and Manifestations of the Exanthematous Disease.

Of the 17 cases, in six (Cases 135, 137, 140, 143, 147 and 149) the diagnosis of German measles was made by medical practitioners. In Case 136 the medical practitioner was unable to differentiate between rubella and morbilli. In the remaining instances in which medical attention was not sought at the time of the exanthem, in Cases 138, 146 and 148 the husband, in Case 133 a daughter, in Case 144 a son, and in Case 134 a sister-in-law had suffered from rubella one or two weeks before. In Cases 139 and 141 the disease was epidemic in the district at the time.

Premonitory Symptoms.

Premonitory symptoms occurred in nine instances and usually preceded the rash by intervals of two or three days. Three mothers (Cases 136, 143 and 148) stated that they were "off colour" and two (Cases 144 and 146) that they were "miserable". One mother (Case 133) felt as though she was getting influenza. Tiredness and sleepiness occurred in Cases 138 and 148, in the former case preceding the exanthem by fourteen days. Other symptoms included headache (Cases 140 and 144), anorexia (Cases 136 and 144), sore throat (Cases 143 and 145), "running nose" (Cases 133 and 136), shivering attacks (Cases 144 and 148) and post-auricular lymphadenitis (Case 143).

Character of the Exanthem.

In general the rash consisted of spots about the size of pins' heads, packed closely together and slightly raised. In Cases 139 and 141 the spots were about twice the usual size, and in Case 136 about four times the usual size. Sometimes the spots ran into each other, so much so that in Case 137 the patient's mother-in-law told her that she had "a face like a nutmeg grater". Itchiness of the rash was complained of only in Cases 133, 140, 141 and 149.

In Cases 136, 142 and 146 the exanthem was distributed over the entire body at the outset. In Case 135 the rash commenced on the chest, in Cases 137 and 149 on the face, in Case 140 on the face and chest, in Case 141 on the face and neck, and in Case 148 on the abdomen; in all these cases it later became generalized. In Cases 133 and 145 the spots were first noticed on the arms and subsequently involved the chest, while in Case 134 they began on the neck and spread to the face, arms and trunk. In Case 138 the exanthem first involved the body and later the limbs, in Case 139 the face and subsequently the arms, and in Case 143 the chest and then the abdomen. In Cases 144 and 147 the rash was confined to the trunk.

On an average the exanthem lasted for three days. However, in Case 145 it was present for only one day, and in Cases 135, 139 and 144 for a week.

Lymphadenitis.

Swelling of the post-auricular or cervical lymph glands or of both was present in eight instances (Cases 133, 136, 137, 141, 143, 145, 148 and 149), absent in two (Cases 135 and 147) and doubtful or "not known" in the remainder.

Concomitant Signs and Symptoms.

Photophobia and soreness of the eyes were complained of in five cases (Cases 136, 137, 138, 140 and 148) and denied in four cases (Cases 135, 141, 145 and 149). One mother (Case 144) stated that her eyes ached.

Cough was absent in 11 instances (Cases 133, 135, 136, 138, 141, 142, 143, 145, 146, 148 and 149), present in one (Case 147) and doubtful in one (Case 139).

Three mothers (Cases 137, 141 and 144) suffered from sore throat; in one instance (Case 137) it lasted for a month. Headache was experienced in three instances (Cases 135, 140 and 144); in one (Case 140) it was very severe. Two mothers (Cases 144 and 146) complained of backache; in addition the first of these said that she "ached all over". Pain and stiffness of the neck were noted in Case 135. Three patients (Cases 135, 144 and 147) suffered from malaise. One mother (Case 139) stated that she felt "weak" for four days, and another (Case 146) that she was "miserable for a week afterwards". Two patients (Cases 144 and 146) felt very tired. Anorexia occurred in Cases 140, 141 and 143, and pyrexia in Cases 135, 141 and 144.

Sequela.

One patient (Case 139) has had neuritis in the arms and hands ever since her attack of rubella.

Source of Infection.

In Cases 137, 138, 146 and 148 the husband, in Cases 135 and 144 a son, in Case 133 a daughter, in Cases 134 and 149 a sister-in-law, and in Case 140 another guest at a boarding-house were considered to be the probable sources of infection.

Previous Infectious Diseases.

If one indefinite case (Case 134) is excluded, all of the remainder of the mothers except two (Cases 136 and 138) had suffered from morbilli. Thirteen patients (Cases 133, 135, 136, 137, 139, 140, 141, 143, 144, 146, 147, 148 and 149) had had mumps, nine (Cases 133, 135, 136, 137, 140, 143, 146, 148 and 149) had had whooping-cough, seven (Cases 135, 138, 140, 141, 143, 147 and 148) had had chickenpox, and three (Cases 141, 143 and 144) had had diphtheria. Only one mother (Case 145) had suffered from German measles; she stated that she had contracted the disease three times.

Miscarriages.

Six mothers had had a miscarriage, five of them (Cases 133, 135, 136, 138 and 141) prior to and one (Case 142) subsequent to the pregnancy in which they had suffered from German measles. One mother (Case 134) had had two miscarriages after the pregnancy in which she had contracted rubella.

TABLE II.

Analysis of Type and Period of Onset of Infectious Disease during Pregnancy and of the Congenital Defects in the Infants Born Subsequently.

Case Number.	Place of Residence of Mother at Time of Disease (Unless otherwise stated, in State of South Australia.)	Age in Years.	Disease During Pregnancy.	Number of Months Pregnant at Onset of Disease.	Date of Last Menstrual Period Prior to Pregnancy.	Date of Birth of Baby.	Expected Date of Birth.	Sex of Child.	Birth Weight. (Pounds and Ounces.)	Circumference of Skull (Inches); Normal Measurement for Age and Sex in Parentheses.	Congenital Defects.	Remarks.
133	Enfield.	30	Rubella.	½[1]	10.7.45	20.4.46	17.4.46	M.	9 12	14·4 (13·9)		Mother suffers from *diabetes mellitus*.
134	Coburg, Victoria.	27	Rubella.	½[1]	11.5.41	28.2.42	18.2.42	M.	6 4		Bilateral cataract.	Baby died from pneumonia at age of six months.
135	New Hindmarsh.	25	Rubella.	Not more than 1½	6.1.39	29.9.39	13.10.39	F.	6 0	20·1 (19·6)	Umbilical hernia.	
136	Myrtle Bank.	32	? Rubella. ? Morbilli.	1½	? August, 1942	3.5.43		F.	6 8	18·5 (19·3)	Microcephaly.	
137	Beaumaris, Victoria.	31	Rubella.	2	16.7.42	12.4.43	23.4.43	M.	6 12	18·8 (19·6)	Deaf-mutism.	
138	Port Noarlunga.	20	Rubella. Varicella.	? 2 ? 4	October, 1939	13.7.40		F.	5 8	19·1 (19·6)	Deaf-mutism.	
139	Lenswood.	29	Rubella.	? 2	?	20.4.40		F.	6 9	19·5 (19·6)	Deaf - mutism, heart disease.	
140	Moonee Ponds, Victoria.	28	Rubella.	2½	?	6.12.40		M.	7 14	20·3 (20·0)	Heart disease, bifid uvula.	
141	Clare.	27	Rubella.	3[1]	14.11.44	9.9.45	21.8.45	M.	8 1	17·0 (17·2)	Heart disease.	
142	Prospect.	25	Rubella.	3	?	18.4.41		M.	5 8	18·9 (20·0)	Deaf - mutism, heart disease.	
143	Adelaide.	24	Rubella.	3	?	6.5.43		F.	7 3	18·5 (19·1)	Deaf - mutism, heart disease.	
144	Glenside.	31	Rubella.	? 3	?	24.11.40		F.	8 12	19·1 (19·6)	Mental deficiency, epilepsy, right concomitant strabismus.	
145	Tenterfield, N.S.W.	26	Rubella.	3½ to 4	16.7.42	30.4.43	23.4.43	M.	8 0	20·4 (19·8)	Deaf - mutism. heart disease.	
146	Adelaide.		Rubella.	4	? 2.5.40	9.2.41	? 9.2.41	F.		19·1 (19·6)	Speech defect, heart disease.	
147	Myponga.	31	Rubella.	4½	13.3.41	19.12.41	20.12.41	M.	7 4	20·4 (19·9)	Right concomitant strabismus.	
148	Myrtle Bank.	28	Rubella.	4 to 5.	8.6.39	1.4.40	15.3.40	F.	9 6	20·3 (19·6)	Heart disease.	
149	Wallaroo.	25	Rubella.	6½[1]	11.3.41	5.1.42	18.12.41	F.	8 8	20·1 (19·5)		
150	Semaphore.	24	Morbilli.	1½[1]	28.3.45	14.1.46	5.1.46	M.	6 10½	15·1 (14·9)		
151	Richmond.	23	Morbilli.	? 2½ to 3	27.7.44	7.5.45	3.5.45	M.	7 15½	18·1 (17·3)	Heart disease.	
152	Barmera.	22	Morbilli.	4–5	20.4.43	2.2.44	27.1.44	M.	8 7	19·3 (19·3)		

[1] Duration of pregnancy calculated from fourteenth day after onset of the last menstrual period.

TABLE II.—*Continued.*

Analysis of Type and Period of Onset of Infectious Disease during Pregnancy and of the Congenital Defects in the Infants Born Subsequently.—Continued.

Case Number.	Place of Residence of Mother at Time of Disease (Unless otherwise stated, in State of South Australia.)	Age in Years.	Disease During Pregnancy.	Number of Months Pregnant at Onset of Disease.	Date of Last Menstrual Period Prior to Pregnancy.	Date of Birth of Baby.	Expected Date of Birth.	Sex of Child.	Birth Weight. (Pounds and Ounces.)	Circumference of Skull (Inches); Normal Measurement for Age and Sex in Parentheses.	Congenital Defects.	Remarks.
153	Western Australia.	25	Mumps.	4½	8.3.45	25.12.45	15.12.45	F.	6 2	13·0 (14·7)	Mongolism.	Died at age of three months bronchopneumonia. Autopsy not permitted.
154	Broadview.	35	Mumps.	? 4½	?	2.9.32	?	M.	6 4	19·3 (20·5)	Mongolism, heart disease.	
155	Semaphore.	28	Scarlet fever.	1½[1]	3.7.45	9.4.46	10.4.46	M.	7 3	13·8 (13·9)		
156	Prospect.	21	"Rheumatic influenza."	? 7	?	12.4.41	?	F.	5 3	18·9 (19·6)	Deaf-mutism.	
157	Wunkar.		Pustular rash.	3–4	?	16.8.45	?	M.	7 4	15·9 (17·2)	Bilateral cataract, mongolism.	

[1] Duration of pregnancy calculated from fourteenth day after onset of the last menstrual period.

Babies Resulting from Pregnancies Subsequent to that in which the Mother Suffered from Rubella.

Five mothers (Cases 134, 138, 140, 145 and 146) had given birth to a further child and one (Case 142) to three further children. In all instances the children were normal.

Relation of the Period of Pregnancy at which the Exanthem Occurred to the Development of Congenital Abnormalities in the Child.

Eleven of the 15 mothers who gave birth to children with congenital defects had contracted German measles within the first three months of pregnancy (Table III). Of the four exceptions, two (Cases 145 and 146) suffered from the disease in the fourth month and two (Cases 147 and 148) in the fifth month.

TABLE III.

Relationship between the Time of Contraction of Rubella during Pregnancy and the Occurrence of Congenital Malformations in the Infants Born Subsequently.

Month of Pregnancy.	Number of Infants with Congenital Defects.	Number of Normal Children.	Total.
0 to 1	1	1	2
1 to 2	5	—	5
2 to 3	5	—	5
3 to 4	2	—	2
4 to 5	2	—	2
5 to 6	—	—	0
6 to 7	—	1	1
7 to 8	—	—	0
8 to 9	—	—	0
Total	15	2	17

In the two cases in which the babies born subsequently were apparently normal, one mother (Case 133) had had rubella in the first month of pregnancy and one (Case 149) in the seventh month.

The Nature of the Congenital Defects.

Of the 15 babies with abnormalities, seven were males and the rest females.

The average birth weight of 14 of the infants with congenital defects was seven pounds two ounces. The birth weights of the two apparently normal children were nine pounds twelve ounces (Case 133) and eight pounds eight ounces (Case 149). (In the former instance the mother suffered from *diabetes mellitus*.)

In 14 instances it was possible to compare the weight and height with the standards for age and sex. The children in the following six cases were underweight: Case 146 (eight pounds underweight), Case 138 (six pounds), Case 142 (four and a half pounds), Case 135 (four pounds), Case 143 (two pounds) and Case 136 (one pound). In Cases 137, 141 and 148 the weight was normal. In the following instances the children were overweight: Case 149 (ten and a half pounds overweight), Case 147 (four and a half pounds), Case 140 (four pounds) and Cases 139 and 145 (two pounds). (Variations from normal of less than one pound were disregarded.)

The children in the following cases were below standard height: Case 146 (three inches less than normal), Case 142 (2·2 inches), Cases 138 and 141 (approximately one inch) and Case 143 (0·5 inch). Seven children were taller than normal: Case 149, 3·2 inches above standard height; Cases 145 and 147 approximately 2·5 inches; Cases 136, 137 and 148, approximately 1·5 inches, and Case 139, 0·7 inch. Variations of 0·5 inch or less were disregarded.

As has been mentioned above, Tallerman and Rose[22] consider that variations of less than 20% in the case of weight and of less than 6% in the case of height from accepted average standards are not significant. On this basis one child (Case 146) was underweight and one (Case 149) was overweight. One subject (Case 146) was shorter

and three (Cases 145, 147 and 149) were taller than normal.

When variations between the actual and expected dates of birth of less than a week are set aside, in the eight cases in which information was available only two babies (Cases 135 and 137) were premature.

With regard to the position of the infants in their respective families, eight (Cases 134, 138, 141, 142, 145, 147, 148 and 149) were the first children, four (Cases 136, 140, 143 and 144) were the second children, three (Cases 135, 137 and 139) were the third children, one (Case 146) was the fourth child and one (Case 133) was the sixth child.

Six mothers (Cases 136, 137, 140, 142, 144 and 145) complained that their babies were difficult to feed.

Two infants (Cases 138 and 142) exhibited slight delay in sitting up; the first of the two also showed slight delay in walking. In Case 144 the child did not walk until the age of two and a half years; at the age of five years she still had no control over micturition and defæcation. In Case 146 control over defæcation was not gained until the age of three and a half years.

The infectious diseases contracted by the children included morbilli (Cases 137 and 139), rubella (Case 148), either morbilli or rubella (Case 138), chickenpox (Cases 137 and 140), whooping-cough (Cases 140, 148 and 149) and mumps (Case 139).

Eye Defects.

Of the three subjects with eye defects, one (Case 134) suffered from bilateral cataract and two (Cases 144 and 147) from concomitant strabismus; the mothers had suffered from German measles in the first, third and fifth months of pregnancy, respectively.

In Case 134 we did not have the opportunity to examine the baby. The case is included in the series through the kindness of Dr. E. D. Byrne, of Coburg, Victoria. Clinically, although the child was specifically examined for the condition, there was no evidence of any cardiac abnormality. Death occurred at the age of six months from pneumonia. Unfortunately no autopsy was performed.

In addition to intermittent right concomitant strabismus the child in Case 144 was mentally defective and suffered from epileptic fits.

A history of squint was obtained on both the paternal and maternal sides of the family in Case 147; two of the child's cousins suffered from the condition.

Deaf-Mutism and Speech Defects.

The series consisted of seven subjects (three males and four females) (Table IV). Five of the children (Cases 139, 142, 143, 145 and 146) suffered also from heart disease. Three of the mothers (Cases 137, 138 and 139) had contracted rubella in the second month of pregnancy, two (Cases 142 and 143) in the third month, and two (Cases 145 and 146) in the fourth month.

The patients included one child (Case 137) who was apparently stone deaf, and two children (Cases 143 and 145) who were moderately deaf; all suffered from secondary mutism. In a further two cases slight deafness was present; in one (Case 138) speech was imperfect, while in the other (Case 139) the onset of speech was delayed. Two other subjects (Cases 142 and 146) manifested speech defects; in the former case the child was probably slightly deaf in the right ear. As we pointed out earlier,[7] the speech defects may perhaps be secondary to the presence of small "islands" of deafness.

TABLE IV.

Analysis of Congenital Deaf-mutism and Speech Defects following Rubella in Pregnancy.

Case Number.	Age of Child at Time of Examination. (Years and Months.)	Hearing.	Speech.	Hearing Tests with Tuning Forks of High (2,048) and Low (512) Pitches.	Associated Defects.
137	2 7	Parents believe he is stone deaf. Has never appeared to notice the noise of an aeroplane, the telephone ringing or the wireless.	Has made no attempt to speak. Vocalizes.	No apparent response.	
138	5 4	Deafness first suspected at age of two and a half years, when the child would not respond to calling and did not appear to hear people walking up to her. She responded to hand-clapping. Now the child can hear most common sounds, but not always if they are soft.	Started to speak at age of eighteen months. Speech is good for the repetition of words said to her. Carries on a reasonable conversation, but leaves out occasional words and speech is slightly imperfect.	Hears high tones and very loud low tones.	
139	5 11	Up to about six feet away can hear the spoken voice. Hears most normal sounds.	Started to speak (a few words) at the age of three years. Now speaks in sentences.	Child would not cooperate.	Heart disease.
142	4 11	Appears to hear all normal sounds but is probably slightly deaf in right ear.	Started to say single understandable words at the age of three years. Has been able to carry on a conversation since age of four years, but speech is indistinct and he stammers. At the age of three years used to say "Father Maxmax" instead of "Father Christmas". Until a month before examination used to say "Wavey" instead of "David". Cannot say "elephant".	Child would not cooperate.	Heart disease.
143	2 7	Child was first thought to be deaf at the age of one year and ten months. Sometimes can hear her mother calling her, especially if her voice is shrill. May hear an alarm clock, but probably not aeroplanes. Hears the cockatoo screeching and probably a whistle. Imitates a motor car.	Says "ah" for "ta". Vocalizes.	Hears high tones with left ear, but not with right.	Heart disease.
145	2 11	Hears mother when calling loudly. Hears better when inside than when out of doors. Can hear a train whistle and people whistling. Hears people walking up to him, but this may perhaps be due to vibration. Hears a baby cry, aeroplanes, and motor-car horns and engines.	Says "ah" and "ta". Gibbers a lot. Vocalizes.	Hears high tones with both right and left ears.	Heart disease.
146	4 10	Mother believes hearing is good. Appears to hear all normal sounds.	Started to speak at age of one and a half to two years. Speech has always been defective. For "hat" says "ho", for "spot" says "spart", for "heather" says "he". For many words "just jabbers". Has said short sentences like "Joy tore my book", but usually sentences are limited to two words and she cuts syllables off words.	Hears both high and low tones.	Heart disease.

Cardiac Defects.

In eight instances (four male and four female subjects) there was X-ray evidence indicative or suggestive of heart disease (Table V). In all except one instance (Case 146) clinical examination gave negative results. Two of the children (Cases 141 and 148) were free from any other malformation. Additional abnormalities in the remaining cases were deaf-mutism (Cases 139, 142, 143 and 145), a speech defect (Case 146) and a bifid uvula (Case 140).

Microcephaly.

In one instance (Case 142) the head circumference was 1·1 inches less than normal, and in six instances (Cases 136, 137, 138, 143, 144 and 146) it was between 0·5 and 0·8 inch less than normal. (Variations of 0·3 inch or less were disregarded.) In Case 136 microcephaly was the only anomaly observed.

In six cases (Cases 133, 135, 145, 147, 148 and 149) the head circumferences were between 0·5 and 0·7 inch greater than normal.

Other Abnormalities.

In Case 135 the child suffered from an umbilical hernia, of sufficient moment to warrant herniotomy when she was aged one year and nine months.

In Case 140 the baby had a bifid uvula in addition to heart disease.

The abnormalities in Case 144 included strabismus, epilepsy and mental defect. From the age of eleven months the child used to have "screaming attacks". When she reached the age of three and a half years she began to have frequent seizures, which lasted from ten to fifteen seconds, and which were sometimes associated with opisthotonos. On her admission to "Minda" home at the age of four years she was classified as a "low-grade ament". For a year she has been free from fits. It is of interest that the baby's cousin suffers from epileptic fits and *diabetes mellitus* and is mentally subnormal. She also is an inmate of "Minda" home.

Morbilli During Pregnancy and Congenital Abnormalities.

The series comprised three cases (Table II); one mother (Case 150) had suffered from morbilli in the second month of pregnancy, one (Case 151) in the third month, and one (Case 152) in the fifth month. The babies in Cases 150 and 152 were normal. In Case 151, however, although there was no clinical evidence of heart disease, X-ray examination revealed that the heart was enlarged, the appearances suggesting a congenital abnormality.

Mumps During Pregnancy and Congenital Malformations.

Two mothers (Cases 153 and 154) contracted mumps, both of them in the fifth month of pregnancy. In each instance the infant born subsequently suffered from mongolism. Both children were microcephalic. In addition, in Case 154 the child showed radiographic evidence suggestive of heart disease. The radiological report was as follows: "The waist on the left is a little filled in and the vascular markings prominent. There is no increase in the size of the heart or other deformity." The baby in Case 153 was the first child and in Case 154 the fifth child of the family.

Absence of Congenital Defects following Scarlet Fever in Pregnancy.

In one instance (Case 155) the mother suffered from scarlet fever in the second month of pregnancy. Examination of the infant born subsequently revealed no abnormality.

"Rheumatic Influenza" During Pregnancy and Congenital Malformations.

In Case 156, when about seven months pregnant, the mother contracted "rheumatic influenza". The disease was characterized by pyrexia, sweating, anorexia, extreme tiredness and aching in the joints and back. The mother was so stiff that she was unable to make her bed. Neither vomiting nor a rash was present. The patient stated that she was well during the early months of pregnancy.

The child was first suspected of deafness at the age of twenty-one months, when she did not begin to talk and would not respond to hand-clapping. At the age of four years and eleven months she still does not hear people walking up to her. She can hear a whistle blowing and will imitate the blowing of long and short blasts. The patient can also hear the wireless, motor-car engines, horns, aeroplanes and people talking loudly. Speech is limited to "mum" and "dad". There is no family history of deaf-mutism. The child is also slightly microcephalic (Table II).

Pustular Rash During Pregnancy and Congenital Anomalies.

In Case 157 the mother stated that when she was in the fourth month of pregnancy she developed a rash on the head and shoulders, which lasted from six to eight weeks. The spots were raised and red in colour except for their centres, which were pustular. They varied in size from a pin's head to a pea. The rash was itchy and was associated with cervical lymphadenitis. Approximately a year later the mother still had blotchy skin. Some other members of the family also suffered from the condition.

TABLE V.

Analysis of Cardiac Defects in Babies following Rubella in Pregnancy.

Case Number.	Signs and Symptoms of Heart Disease.	Report on X-Ray Examination.	Associated Defects.
139	No clinical evidence of heart disease.	"Although the heart shadow is not increased in size it has an abnormal outline, being globular with a small aorta and filling in of the left waist."	Deaf-mutism.
140	No clinical evidence of heart disease.	"The waist of the heart on the left is convex, with increased pulmonary vascular markings. Possibly a congenital defect."	Bifid uvula.
141	No clinical evidence of heart disease.	"The transverse diameter of the heart is slightly increased, and no aorta is visible, the appearance suggesting a congenital defect."	
142	No clinical evidence of heart disease.	"The transverse diameter of the heart is increased, with increased pulmonary vessel markings."	Deaf-mutism.
143	No clinical evidence of heart disease.	"There is no visible aorta and the left border of the heart is definitely convex, suggesting congenital defect."	Deaf-mutism.
145	No clinical evidence of heart disease.	"The heart is a little enlarged with filling in of the waist on the left, suggesting congenital abnormality."	Deaf-mutism.
146	The second sound in the pulmonary area is "clicking" and rough.	"The transverse diameter of the heart is increased, with filling in of the waist, suggesting a congenital defect."	Speech defect.
148	No clinical evidence of heart disease.	"The waist of the heart is filled in and the pulmonary vessels are prominent, no aorta is visible, the size of the heart being just within the normal. There is probably a congenital defect."	

Examination of the baby at the age of seven months disclosed mongolism associated with bilateral cataract and microcephaly (Table II). The cataracts were nuclear in type and accompanied by nystagmus. Microphthalmos, however, was absent. The infant was the seventh child of the family.

A SUMMARY OF INVESTIGATIONS CARRIED OUT IN SOUTH AUSTRALIA (1942-1946).

This summary is based on the present and earlier papers.[2][3][4][5][7]

Rubella During Pregnancy or Just Prior to Conception and Congenital Abnormalities.

The total number of cases recorded was 120 (see Table VI).

The geographical distribution of the maternal infection was as follows: South Australia, 107 cases; New South Wales, 7 cases; Victoria, four cases; Western Australia, one case; Scotland, one case.

The following was the annual incidence of the maternal infection: 1938, one case; 1939, 22 cases; 1940, 23 cases; 1941, 16 cases; 1942, 43 cases; 1943, six cases; 1944, three cases; 1945, three cases; indeterminate, three cases. (Of the three indeterminate cases, in two the disease was contracted in either 1940 or 1941, and in one in either 1942 or 1943.)

The monthly incidence of maternal infection had the following distribution: January, four cases; February, seven cases; March, two cases; April, no cases; May, two cases; June, five cases; July, 12 cases; August, 21 cases; September, 26 cases; October, 17 cases; November, 13 cases; December, nine cases; indeterminate, two cases. (In 12 instances, in which it was uncertain whether the infection occurred at the end of a particular month or at the beginning of the next one, the cases were classified with the former.)

The nature of the maternal infection was as follows: rubella, 111 cases; rubella and morbilli, one case; rubella and "soldier's" ("Woodside") throat, two cases; rubella and mumps, three cases; rubella and varicella, one case; doubtful rubella, two cases. (In the two doubtful cases the diagnosis lay between rubella and morbilli.)

The following was the time of onset of the maternal infection (the number of cases in which the infection was followed by congenital abnormalities is shown in parentheses): the month preceding conception, two (0) cases; first month of pregnancy, 20 (19) cases; second month, 42 (40) cases; third month, 23 (21) cases; fourth month, eight (seven) cases; fifth month, seven (four) cases; sixth month, six (three) cases; seventh month, five (two) cases; eighth month, three (two) cases; ninth month, two (one) cases; month indeterminate, two (two) cases.

Of the congenitally defective offspring 57 were males and 44 females; of the normal offspring eight were males and 10 females; the sex of one child is not known.

The various abnormalities had the following frequencies: microcephaly, 62 cases; heart disease, 52 cases; deaf-mutism, 48 cases (one child suffered from deafness only); cataract, 18 cases (12 bilateral, six unilateral); mental deficiency, five cases; strabismus, four cases; cryptorchidism, four cases; inguinal hernia, three cases; *spina bifida occulta*, three cases; high-arched palate, three cases; mongolism, two cases; speech defect, two cases; epilepsy, two cases; cleft palate (soft), two cases; pyloric stenosis, two cases; buphthalmos, one case; hypospadias, one case; hydrocele, one case; bifid sternum, one case; spastic diplegia, one case; bilateral optic atrophy, one case; lack of closure of the chorioidal fissure of the eye, one case; nævus, one case; Horner's syndrome, one case; hemiparesis, one case; umbilical hernia, one case; obliteration of bile ducts, one case; azygous lobe of lung, one case; fusion of upper ends of radius and ulna, one case; *talipes equinovarus*, one case. (The various combinations of defects, their frequency, and their relationship to the time of onset of the maternal infection, to the year of occurrence of the infection, and to the birth weight of the infants are shown in Table VI.)

Relationship of Time of Onset of Maternal Infection During Pregnancy and Type of Congenital Abnormality.

In the 16 cases in which cataract occurred, the time of onset of the maternal infection was as follows: first month, nine cases; second month, six cases; third month, one case. In the 46 cases of deaf-mutism (one child suffered from deafness only), the distribution was as follows: first month, four cases; second month, 25 cases; third month, 13 cases; fourth month, three cases; indeterminate, one case. In the two instances in which cataract and deaf-mutism were present in combination, the distribution was as follows: first month, one case; second month, one case.

Deaths.

Ten of the 118 children of the series died. Of these, nine had defects and one was normal. It is noteworthy that among the malformations exhibited by the nine babies with abnormalities there were seven instances of eye defect (cataract in six cases, buphthalmos in one case) and five of heart disease.

Abortions.

Two mothers were subjected to therapeutic abortion. In one instance, in which rubella was contracted just prior to conception, the fœtus as far as could be determined was normal. In the other case, in which the mother suffered from the disease in the second month of pregnancy, examination of the fœtus revealed unilateral cataract with lack of closure of the chorioidal fissure of the eye.

Birth Weight.

The birth weights were as follows for babies with abnormalities and normal babies. Of babies with abnormalities, two weighed two to three pounds, five weighed three to four pounds, 14 weighed four to five pounds, 22 weighed five to six pounds, 29 weighed six to seven pounds, 14 weighed seven to eight pounds, eight weighed eight to nine pounds, one weighed between nine and ten pounds, and the weight of six is not known. Of the normal babies, two weighed four to five pounds, one weighed between five and six pounds, three weighed six to seven pounds, six weighed seven to eight pounds, three weighed eight to nine pounds, one weighed between nine and ten pounds, and the weight of three is not known.

It is of interest that among the anomalies observed in the seven babies whose birth weight was less than 4·0 pounds there were seven instances of microcephaly, five of eye defect (cataract in four cases, buphthalmos in one) and five of heart disease. Other defects in these seven infants included mental deficiency (two instances) and deaf-mutism, high-arched palate, *spina bifida occulta*, bifid sternum, inguinal hernia and cryptorchidism (each in one instance).

Morbilli During Pregnancy and Congenital Malformations.

The total number of cases of morbilli during pregnancy recorded was 18; all occurred in South Australia.

The time of onset of maternal infection during pregnancy was as follows (the number of cases in which the infection was followed by abnormalities is shown in parentheses): first month, one (0) case; second month, two (0) cases; third month, four (two) cases; fourth month, three (two) cases; fifth month, three (0) cases; seventh month, one (0) case; eighth month, two (0) cases; ninth month, one (0) case; indeterminate, one (0) case.

Of the offspring nine were males and seven were females; the sex of two is not known.

Nature of Abnormalities.

Spontaneous abortion occurred ten days after the onset of the exanthem in one case. The following were the abnormalities in the babies: heart disease, one case; heart disease and pyloric stenosis, one case; *genu valgum*, one case.

The birth weights were as follows: five babies weighed 6·1 to 7·0 pounds, three babies weighed 7·1 to 8·0 pounds,

TABLE VI.

Analysis of Data on Congenital Malformations in Infants following Maternal Rubella during Pregnancy or just prior to Conception.

Nature of Defects.	Case Numbers.	Total Number of Cases.	Sex Incidence.			Time of Onset of Maternal Infection. (Months.)											Year of Occurrence of Maternal Infection.									Infant's Birth Weight. (Pounds.)									Number of Infants Who Died.
			Males.	Females.	Indeterminate.	Prior to Conception.	During Pregnancy.										1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	Indeterminate.	2 to 3.	3 to 4.	4 to 5.	5 to 6.	6 to 7.	7 to 8.	8 to 9.	9 to 10.	Indeterminate.	
						First.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Indeterminate.																				
Bilateral cataract	134	1	1				1													1									1					1
Bilateral cataract, heart disease	6	1	1				1														1						1							1
Bilateral cataract, heart disease, microcephaly	16, 24, 65	3	1	2			1	2												1	2							1	2					1
Bilateral cataract, heart disease, microcephaly, cryptorchidism	2	1	1				1													1										1				
Bilateral cataract, microcephaly, deaf-mutism, mental deficiency	1	1		1			1												1								1							
Bilateral cataract, microcephaly	7, 26, 28	3	1	2			2		1									1		1	1						1		2					1
Bilateral cataract, microcephaly, mental deficiency, high-arched palate, bifid lower third of sternum	8	1		1			1													1					1								
Bilateral cataract, unilateral cryptorchidism and hydrocele	9	1	1					1										1															1	1
Unilateral cataract, heart disease, microcephaly	4, 25	2		2			1	1										1			1						1	1						1
Unilateral cataract, heart disease, microcephaly, *talipes equino-varus*, cryptorchidism, unilateral inguinal hernia, *spina bifida occulta*	15	1	1					1											1							1								
Unilateral cataract, heart disease, microcephaly, deaf-mutism	85	1		1				1														1					1							
Unilateral cataract, microcephaly	64	1		1			1														1									1				
Unilateral cataract, lack of closure of fœtal fissure	91	1	1					1														1											1	1 (aborted)
Bilateral buphthalmos, heart disease, microcephaly, mental deficiency	17	1		1				1											1								1							1
Strabismus	147	1	1								1									1										1				
Deaf-mutism	12, 19, 35, 67, 83, 90, 94, 98	8	3	5				7	1									3	4		1								1	5	2			
Deaf-mutism, heart disease	62, 81, 99, 103, 104, 139, 145	7	6	1				2	3	1						1		2	2	2	1							1		3	2	1		
Deaf-mutism, heart disease, microcephaly	21, 23, 27, 63, 68, 69, 78, 79, 80, 84, 89, 101, 102, 142, 143	15	11	4			2	6	7									3	5	1	6					1		4	3	4	2			1	
Deaf-mutism, heart disease, microcephaly high arched palate	5	1		1			1											1										1						
Deaf-mutism, heart disease, strabismus	96	1	1					1													1								1					

| Deaf-mutism, heart disease, strabismus | 96 | 1 | 1 | | |

TABLE VI.—*Continued.*

Analysis of Data on Congenital Malformations in Infants following Maternal Rubella during Pregnancy or just prior to Conception.—Continued.

Nature of Defects.	Case Numbers.	Total Number of Cases.	Sex Incidence.			Time of Onset of Maternal Infection. (Months.)														Year of Occurrence of Maternal Infection.										Infant's Birth Weight. (Pounds.)										Number of Infants Who Died.
			Males.	Females.	Indeterminate.	Prior to Conception.	During Pregnancy.													1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	Indeterminate.	2 to 3.	3 to 4.	4 to 5.	5 to 6.	6 to 7.	7 to 8.	8 to 9.	9 to 10.	Indeterminate.	
						First.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Indeterminate.																								
Obliteration of bile ducts	70	1		1						1												1											1				1
Azygos lobe of right lung	38	1	1								1												1									1					
Hypospadias	3	1	1				1															1											1				
No apparent defects	18, 30, 31, 35, 37, 39, 40, 42, 45, 46, 49, 72, 93, 107, 111, 115, 116, 133, 149	19	8	10	1	2	1	2	2	1	3	3	3	1	1	2	1	22	23	1	2	10	2	2	2	3	2	5	16	23	32	20	11	2	3	2 (1 aborted)
Totals		120	65	54	1	2	20	42	23	8	7	6	5	3	3	2	1	22	23	1	2	16	43	6	3	3	3	2	5	16	23	32	20	11	2	3	9	12

four weighed 8·1 to 9·0 pounds, two weighed 9·1 to 10·0 pounds, and the weight of four is not known.

Mumps During Pregnancy and Congenital Anomalies.

The total number of cases of mumps during pregnancy recorded was six. Five of the infections occurred in South Australia and one in Western Australia.

The time of onset of the maternal infection during pregnancy was as follows (the number of cases in which the infection was followed by abnormalities is shown in parentheses): first month, two (two) cases; fourth month, one (one) case; fifth month, two (two) cases; seventh month, one (one) case.

Of the offspring three were males and three females.

The nature of the abnormalities was as follows: mongolism, two cases (in addition one child had heart disease and both had microcephaly); bilateral corneal opacities, one case; nævus, one case; imperforate anus, one case; microcephaly, one case.

The birth weights were as follows: two babies weighed 6·1 to 7·0 pounds, one weighed between 7·1 and 8·0 pounds, two weighed 8·1 to 9·0 pounds, and the weight of one is not known.

Varicella During Pregnancy and Congenital Defects.

The total number of cases of varicella during pregnancy recorded was two; both occurred in South Australia.

The time of onset of the maternal infection during pregnancy was the seventh month in both cases; one of the babies was abnormal. Both children were females. The abnormalities present were heart disease and nævus both in one case. At birth one baby weighed between 7·1 and 8·0 pounds, and the other weighed between 8·1 and 9·0 pounds.

Herpes Zoster During Pregnancy and Congenital Abnormalities.

The total number of cases of *herpes zoster* during pregnancy recorded was two; both occurred in South Australia.

The time of onset of the maternal infection during pregnancy was the fourth month in one case and the sixth month in one case. In both cases the infections were followed by abnormalities in the infants, who were both females.

The nature of the abnormalities was as follows: deaf-mutism, heart disease and microcephaly each occurred in one case and myelocele, bilateral talipes and right *genu recurvatum* in the other case. (The abnormalities in the former case may have been the result of subclinical rubella.)

The birth weights of the children were as follows: one weighed between 6·1 and 7·0 pounds, and the other weighed between 7·1 and 8·0 pounds.

Scarlet Fever During Pregnancy and Congenital Malformations.

The total number of cases of scarlet fever during pregnancy recorded was two; both occurred in South Australia.

The time of onset of the maternal infection during pregnancy was the second month in one case and the seventh month in one case. In the latter case congenital abnormalities occurred in the infant. Both the children were males.

The abnormality present was obliteration of the bile ducts.

At birth one of the children weighed between 5·1 and 6·0 pounds and the other weighed between 7·1 and 8·0 pounds.

"Influenza" During Pregnancy or Prior to Conception and Congenital Anomalies.

It is probable that a number of conditions are grouped under the title of "influenza".

The total number of cases recorded was three; all occurred in South Australia.

The time of onset of the maternal infection was as follows (the number of cases in which the infection was followed by congenital abnormalities is shown in parentheses): three months before conception, one (one) case;

third month of pregnancy, one (one) case; seventh month, one (one) case.

Of the offspring one was a male and two were females.

The nature of the abnormalities was as follows: bilateral cataract, heart disease and microcephaly, one case; unilateral cataract, heart disease and microcephaly, one case; deaf mutism and microcephaly, one case.

The birth weights were as follows: one baby weighed between 4·1 and 5·0 pounds and two weighed between 5·1 and 6·0 pounds.

Pustular Rash During Pregnancy and Congenital Defects.

One case of a pustular rash during pregnancy was recorded; it occurred in South Australia. The time of onset of the maternal infection was the fourth month of pregnancy. The offspring was a male, who suffered from mongolism, bilateral cataract and microcephaly. The baby weighed between 7·1 and 8·0 pounds at birth.

Congenital Malformations in the Absence of a History of Infection During Pregnancy.

In three cases congenital malformations occurred in the offspring in the absence of a history of maternal infection during pregnancy. The place of residence of the mother during pregnancy was South Australia in two cases and northern Australia in one case. All the babies were females.

The nature of the abnormalities was as follows: unilateral cataract, one case; bilateral cataract, heart disease, microcephaly, probable mental deficiency, one case; mongolism and bilateral cataract, one case.

The birth weight of the infants was between 4·1 and 5·0 pounds in one case and not known in two cases.

Discussion.

Restudy of our first two series of cases[2][3] showed that in the majority of the 28 instances in which additional information was available, it was necessary to modify our previous assessments of the stage of gestation at which the mother had suffered from German measles. In part these alterations were due to further calculations based on the assumption that conception had taken place fourteen days after the onset of the last menstrual period. In the four cases in which we had under-estimated the duration of pregnancy, the variation from the original reckoning amounted to one week, while in 14 of the 18 cases in which we had over-estimated the duration of pregnancy, the difference ranged from one to two weeks. In the remaining four instances, however, the discrepancy was greater, in two of the cases amounting to three weeks. In Case 26 the earlier estimate of two and a quarter months was amended to three weeks, and in Case 35 from approximately three and a half to five months to two and a half months. These modifications brought the times of infection during pregnancy into conformity with the stages of gestation known to be conducive to the occurrence of the respective abnormalities—namely, cataract (Case 26) and deaf-mutism (Case 35)—in the infants born subsequently.

In correlating the type of defect with the time of onset of the maternal infection it has been tacitly assumed that the initial attack of the virus on the embryo coincides in time with the commencement of the exanthem. This assumption is logical, because at this period it is almost certain that the virus is circulating in quantity in the mother's blood stream. However, the possibility cannot be ignored that the virus may gain access to the embryo earlier—that is, during the relatively long incubation period (approximately eighteen days) of the disease. On the other hand, it may take time for the virus to penetrate the barriers between mother and embryo, so that the latter would be attacked subsequent to the beginning of the maternal rash. Obviously, however, if such divergences did occur, they would be of importance only in the early months of pregnancy. During this period even a slight variation in the stage of development of the embryo at the time of its invasion by the virus might be vital in determining not only the occurrence or otherwise of an abnormality, but also the nature of such a defect.

The possibility that the times of onset of the maternal exanthem and of initial infection of the embryo are not necessarily synchronous may be explored from yet another aspect. There is suggestive evidence that infection of the mother with German measles prior to fertilization of the ovum may sometimes be followed by congenital defects. Gregg[1] recorded a case of congenital cataract in a baby whose mother had contracted rubella three months before pregnancy. Subsequently he[22] reported a case of deaf-mutism in which it was not unlikely that the infection had preceded conception. We[5] described a doubtful example and later[7] two negative examples, and postulated that the phenomenon could be explained on the basis of the known property of viruses to persist in the tissues of the host for considerable periods of time after the original infection. Although it is not conclusive, the evidence cited above gains support from the recent communication of Hall,[10] who observed a case of congenital cataract, deaf-mutism and heart disease, in which the mother had suffered from a severe attack of German measles six weeks before the child was conceived.

Perhaps the most important outcome of the follow-up of our earlier cases[2][3] was the detection of four additional examples of deaf-mutism. The result is not unexpected, as the certain diagnosis of this defect may sometimes be difficult even when the child has reached the age of eighteen months or two years. In one of the four cases cataract was also present; the number of instances in which we had observed this abnormality concomitantly with deaf-mutism among our combined series of 101 congenitally defective infants was thus increased to two. In the series recorded by the New South Wales committee,[24] cataract occurred in combination with deaf-mutism in nine out of 130 children with congenital malformations. In Gregg's[22] second series the two anomalies were present together in three out of seven cases. Taken as a whole the data indicate that cataract and deaf-mutism are not commonly encountered together. We[7] have already suggested reasons why this should be so. Yet another explanation is afforded by the fact that there is a high mortality rate among babies suffering from cataract, many of them dying at an early age before deaf-mutism would readily be detectable. Thus, of our combined series of 15 children with cataract, six died; their ages at the time of death ranged from one to seven months. Similarly, Gregg[22] reported that death occurred in more than 15 of his 78 cases of cataract.

In our combined series of cases deaf-mutism was present in 16 instances and cataract in 16—that is, in a proportion of approximately three to one. The pronounced difference in frequency of the two abnormalities is open to several interpretations. It may well be that the primordium of the cochlea remains susceptible to the virus of rubella over a greater period of time during pregnancy than does that of the lens, or even that the *Anlage* of the former organ is more susceptible to attack by the virus than is that of the latter. Finally, because, as we have mentioned above, deaths are common in association with cataract, it is feasible that occasionally offspring suffering from this defect are stillborn or even that they are aborted. Thus we may be labouring under a misapprehension with regard to the actual relative incidence of the two anomalies.

As a result of reexamination of our previous series,[2][3] six additional children with cardiac abnormalities were found. Clinical examination of each patient gave negative results and diagnosis was based on the X-ray findings alone. We have accepted these reports with a degree of caution, for there is evidence that, even when it is carried out with precautions against artefacts, radiography of the cardio-vascular system of children may sometimes lead to falsely positive results. In this connexion it may be mentioned that in three other cases the previously positive X-ray findings could not be confirmed. On this account, in cases of cardiac defect diagnosed on radiographic evidence only, it has been our practice to advise the parents to submit the children to further examinations at intervals as they grow older.

Experimentally it has been shown that when an embryo is attacked by a noxious agent, the main factor in determining the susceptibility of a particular organ is whether or not its cells are in a state of active proliferation. The available evidence supports the view that similar conditions prevail in infection of human embryos by the virus of rubella.[36] It is evident, however, that subsidiary factors must be at work which play a part in deciding the involvement or otherwise of the various primordia. One of them appears to be the degree of specialization of the constituent cells.[7] In an attempt to discover other factors it seemed of interest to test the hypothesis that the virus might have an elective affinity for tissues derived from certain of the three primary germ layers. At the outset it is clear that ectodermal and mesodermal derivatives are much more affected than those of the entoderm, for the brunt of the pathological process is borne by the *Anlagen* of the lens and cochlea (derived from ectoderm) and heart (mesodermal in origin). As far as other derivatives of the ectoderm are concerned, a survey of the literature shows that lesions have been recorded in the retina,[1][2][28][34] in the iris,[1][28][34] and in the optic nerve.[6][34] The central nervous system is implicated, as is evidenced by mental deficiency or retardation[6][28][32][34] and by epilepsy. With regard to the skin, it may be mentioned that in a few of his cases Gregg[1] observed "a dry, scaly, eczematous condition involving the face, scalp and limbs, which was very resistant to treatment". Furthermore, in one of our cases penile hypospadias was present; it will be remembered that the distal portion of the male urethra takes its origin from ectoderm. Whether the dental defects[3] result from lesions of the ectodermal or the mesodermal tissues, or of both, remains to be determined. Our investigations and those of other workers show that in many instances there is involvement of the osseous system, exemplified by generalized stunting of the skeleton, including microcephaly. In addition, other bony abnormalities occasionally occur, including high-arched palate, large size of the anterior fontanelle,[1][3][4][5][13] *spina bifida occulta*, bifid sternum, fusion of the upper ends of the radius and ulna, and *talipes equinovarus*. On the basis of the evidence cited it would appear that there is no significant difference in the susceptibility of primordia of ectodermal and of mesodermal origin to the virus of rubella, provided that allowance is made for the degree of specialization of their cells.

It should be pointed out that as far as microphthalmia is concerned, both ectodermal and mesodermal derivatives are involved; but whether the hypoplasia of the tissues originating from mesoderm is primary or occurs secondarily to the arrest of development of the structures of the eye derived from ectoderm is as yet unknown.

With regard to microcephaly, it is of interest that Murphy[37] observed this defect frequently among the congenital abnormalities occurring subsequent to X radiation of the mother during pregnancy, so that the condition is not specific for rubella.

Up to the present time mongolism has been recorded on four occasions in association with rubella in pregnancy; we[6][7] described two cases, and Gregg[28] and Conte *et alii*[32] each described one. We have also observed the abnormality twice in association with mumps in pregnancy and once in association with a pustular rash, the nature of which was obscure. It would seem that, with the exception of the case of Conte *et alii* and of Case 157, the only factor common to these cases was that in all the infection occurred in the second half of pregnancy. A survey of 15 cases of mongolism recorded at the Adelaide Children's Hospital from the viewpoint of infectious disease during pregnancy gave negative results in every instance. At the moment there are no grounds, therefore, for believing that rubella or any other infection during pregnancy plays any part in the ætiology of mongolism.

An analysis of the monthly incidence of maternal infection with rubella, based on 116 cases which occurred in the year 1940, was undertaken by the New South Wales committee.[33] It was found that the greatest number of cases occurred during the months of July, August and September, the epidemic reaching its peak during August. In a similar analysis, based on 120 cases occurring during the years from 1938 to 1945, our results were substantially the same; but the greatest number of cases was recorded in September—that is, one month later than in New South Wales.

A survey of our combined series of cases showed that approximately two-thirds of the mothers (58 out of 92 cases in which the information was available) who had given birth to a congenitally defective child had not had offspring subsequently. We believe that many of them have refrained from having further babies and will continue to do so because of the fear, conscious or subconscious, that these children also will be malformed. In point of fact there is no cause for alarm. Of 34 mothers who became pregnant after having borne a child with congenital malformations, 27 had had one child, six had had two children and one had had three children. Only one of these babies was born with a defect (*talipes valgus*) and there was no reason to suppose that it was due to the antecedent rubella. In a country such as Australia, which is striving to increase its population, any tendency to the unnecessary limitation of families should be strongly combated. Therefore, the fact that babies born of pregnancies subsequent to that in which a mother has contracted German measles are healthy should be given the widest publicity.

A few women have refrained from having additional children because they find that their time is taken up in caring for a child with crippling congenital malformations. In this connexion a report of a statement by Gregg[29] with regard to the cases in New South Wales is apposite:

> So far the welfare of the children had been the main consideration; attention should also be given to the effect produced on the other members of the homes to which these children belonged. In many of the severe ocular cases, the children were mentally deficient. There was no adequate provision for such children in New South Wales; only with difficulty could arrangements be made for their care after the age of three years. But by the time the child reached such an age, homes were disrupted. The mothers were asked to bear far too much. There should be some way of taking such a mentally defective child from the mother before she had to ruin her home and her life in looking after it.

In one instance (Case 133) in our fourth series of cases contraction of rubella in the first month of pregnancy failed to result in any apparent abnormality in the baby. (As yet the child is very young, and the possibility that he may be deaf has not been entirely eliminated nor has he been submitted to X-ray examination.) On restudy of our first series of cases an example was discovered in which the mother gave birth to a normal child after having suffered from German measles in the second month of pregnancy. A similar case occurred in our third series. Including Case 133, in our combined series of cases only three out of the 62 babies whose mothers had had the infection in the first two months of pregnancy were free from congenital abnormalities. The New South Wales committee[33] reported one instance of infection with rubella in the first month of pregnancy in which the child born subsequently was normal. Meyers[26] has also referred to a case. It is possible, therefore, that German measles in early pregnancy is not invariably followed by congenital defects in the baby. In this connexion a recent report of Fox and Bortin[14] is of considerable interest. These workers surveyed 22,226 cases of rubella reported in the city of Milwaukee during the years 1942 to 1944 inclusive. Of 152 married women investigated, 11 were pregnant when they had rubella. In five of the 11 women the disease had occurred in the first two months of pregnancy, and in four during the second to fourth month. One mother was delivered of a stillborn hydrocephalic infant. With one doubtful exception, in all of the remaining instances the babies born subsequently were normal. The findings of Fox and Bortin and those reached in Australia are thus diametrically opposite. Some of the results obtained by Fox and Bortin, just as is possible in the "negative" cases in the Australian series, may have been due to misdiagnosis. As Attlee[30] has pointed out, the diagnosis of rubella "can be very difficult especially in

isolated cases at the beginning of an epidemic or when other exanthemata are prevalent". Another possible explanation is linked up with an earlier suggestion of ours[2] that the then apparently new manifestations of rubella might have been due to an alteration in virulence of the virus or to "some more subtle change" in its character. Hamilton[20] expressed the view that the particular virus encountered in Australia might be a mutant strain of German measles virus and that this strain might have an affinity for embryonic tissue not possessed by the original strain. However, except for the communication of Fox and Bortin, all other reports from America so far available confirm the findings in Australia, so that we have little reason to suppose that the usual American strain of virus differs essentially from that met with in this country. The possibility cannot be denied, however, that the Milwaukee strain may be different. In this respect it is of interest that in other virus diseases—for example, foot and mouth disease[21] and influenza[22]—antigenically distinct viruses exist which lead to infections clinically closely resembling or identical with each other. A hint that a similar state of affairs may prevail in rubella is contained in the following two statements by Attlee:[23]

> Many school doctors recognize two distinct types of rash, a discrete circular macular and a scarlatiniform, and consider the macular to be less infective than the scarlatiniform.
>
> . . . there is no doubt that different epidemics of German measles, like different epidemics of influenza, differ considerably in detail.

Previously[23] we stressed the advisability of making rubella a notifiable disease; but with the exception of Western Australia[19] up to the present time nothing has been done. Until this important step is taken, no true assessment is possible of the actual incidence of "positive" (those in which the baby suffered from congenital malformations) and of "negative" cases (those in which the infant was normal) following rubella in the early months of pregnancy.

With regard to the effect on the fœtus of other infectious diseases during pregnancy, there is little evidence as yet to suggest that morbilli leads to congenital abnormalities, though it is possible that it may be a cause of abortion. The question whether mumps and other virus conditions may be followed by congenital malformations remains open. As far as mumps is concerned, a number of defects have been recorded, but so far no definite syndrome, such as that associated with rubella, has emerged. If other viruses are found to play a part in the ætiology of congenital anomalies, we postulate that they will be confined to those which circulate at some stage of the infection in the mother's blood stream. The available evidence suggests that maternal infection during pregnancy with strict neurotropes—for example, poliomyelitis—which are apparently confined to axonic pathways and do not invade the blood stream has no effect on the infant born subsequently.

SUMMARY.

Of the 61 children comprising our first and second series, we were able to reexamine 49. It was necessary to modify our earlier assessments of the period of gestation at which the mother suffered from rubella in 22 of the 28 cases in which further information was obtainable; usually we had over-estimated the period. The most important result of the resurvey was the detection of four further cases of deaf-mutism. In one patient spontaneous absorption of a cataractous lens had occurred. Many of the children were retarded in their physical development.

A fourth series consisting of 25 cases was studied. In 17 instances (one doubtful) the mother had contracted rubella in pregnancy. In one case the mother had suffered also from chickenpox. Fifteen of the babies born subsequently exhibited congenital defects. The abnormalities included cataract, deaf-mutism, heart disease, microcephaly, umbilical hernia, bifid uvula, mental deficiency, epilepsy, speech defect and concomitant strabismus. Thirteen of the fifteen mothers had suffered from German measles during the first four months of pregnancy. Of two cases in which the infants were free from congenital malformations, in one the mother had suffered from the disease in the first month and in the other in the seventh month of gestation. The infectious diseases during pregnancy in the remaining eight cases included three cases of morbilli (one of the babies was abnormal), two cases of mumps (both infants had defects), one case of scarlet fever (the baby was normal), one case of "rheumatic influenza" (the infant was malformed) and one case of pustular rash (the baby was defective).

A summary of the investigations as a whole carried out in South Australia during the years 1942 to 1946 precedes the discussion.

ACKNOWLEDGEMENTS.

Our thanks are due to the Board of the Adelaide Children's Hospital for permitting the X-ray examinations to be carried out free of charge. It is impossible to record by name all the many medical practitioners who helped us; we would mention especially, however, Dr. E. B. Sims (medical superintendent, Adelaide Children's Hospital), Dr. H. A. Goode, Dr. A. D. Byrne, Dr. C. Jungfer, Dr. D. R. Wallman, Dr. H. K. Fry, Dr. R. A. Goode, Dr. B. M. Jolly, Dr. P. W. Rice, Dr. M. V. Samuel and Dr. D. Parkhouse. Finally, we are much indebted for assistance in locating cases to Miss J. McDonald, senior clerk of the out-patients' department of the Adelaide Children's Hospital.

ERRATA.

In the course of publication of our results a number of minor errors have appeared in the text. For the sake of exactitude we have deemed it advisable to append a list of corrections here.

First paper:[3] (i) page 203, Table I, Case 8, under "Expected Date of Birth", for "? 20.6.43" read "? 20.6.42"; (ii) page 203, Table I, Case 30, under "Date of Last Menstrual Period Prior to Pregnancy", for "1.4.43" read "1.4.42"; (iii) page 203, Table I, Case 44, under "Birth Weight (lb. and ozs.)" insert "7, 4".

Second paper:[5] page 409, Table I, Case 66, under "Birth Weight (Pounds and Ounces)", insert "6.11".

Fourth paper:[6] (i) page 135, line 20, for "three" read "two and a half"; (ii) page 136, line 41, omit "or not".

Fifth paper:[7] page 658, left-hand column, lines 6 and 54, and right-hand column, line 1, for "noxa" read "noxæ".

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Reviews.

INTRODUCTION TO BIOCHEMISTRY.

SIX years have passed since the appearance of the second edition of Fearon's excellent introduction to biochemistry.[1] The third edition is therefore very welcome. It presents a wealth of biochemical information in an exceptionally clear and concise manner. At the same time it is written in such a stimulating way that even the mediocre student could hardly "study" the book without giving some thought to the subject matter.

The third edition is over ninety pages longer than the second, in spite of some beneficial pruning of the latter. This edition has been brought up to date in many ways. For example, in the section on physical chemistry some account is given of the modern theory of ionization of acids and bases which regards the phenomenon as a reaction with water. Bergmann's classification of the peptidases and Frazer's recent work on the absorption of fats with and without previous hydrolysis have been included.

In a book which abounds with clear schemata of various metabolic processes, the discussion of the Krebs tricarboxylic acid cycle in its relation to the aerobic phase of carbohydrate metabolism and to fat metabolism is very disappointing.

Some rather obvious gaps in the previous edition have been filled. For example, the chapter on the internal environment of the cells has been considerably expanded. Sections on water balance and the respiratory function of the blood have been included in it. A chapter on tissue chemistry, has been added. A table of composition of common food materials has been added to the appendix. A useful table of miscellaneous information has also been added.

The book can be confidently recommended both to the student and to the general reader.

[1] "An Introduction to Biochemistry", by W. R. Fearon, M.A., Sc.D., M.B.; Third Edition; 1946. London: William Heinemann Medical Books, Limited. 8¾" × 5½", pp. 580, with illustrations. Price: 21s. net.

THE FEEDING OF INFANTS.

THE merit of Dr. Collins's little monograph, "Infant Feeding", is its conciseness and brevity.[1] What is so often made a difficult subject, overweighted with mathematics, is here presented in a clear and simple way. We are not surprised that it has proved popular. First published in 1939, the booklet is now appearing in a fourth "edition"—actually a reprint, as there have been no alterations. Even egg "yoke" remains on page 48. It is a pity that the author did not seize the opportunity of making some minor changes. For example, the intraperitoneal use of saline solution is really out of date; stilbœstrol is more effective and less painful than a tight binder for checking the flow of breast milk; and infant mortality figures more recent than 1938 would have looked better. The use of canned evaporated milk, so popular in the United States of America, deserves more space. None the less, this is an excellent book well within the reach of any student, as regards both cost and reading time, and it is certain to be recommended by teachers of pædiatrics throughout Australia.

Notes on Books, Current Journals and New Appliances.

SHORT STORIES OF THE WAR.

THE stories by Jon Cleary, published under the title "These Small Glories", are first rate.[2] They are well written and show wit, imagination and a sense of realism. There is in them no deliberate descent to lewdness, no effort to show the soldier as incapable of tolerably decent speech. They are not trite; and they hold the interest by their vividness and sincerity. One episode only in "Good-Bye My Darling" does not seem possible even in so modern a war as that which has just ended. It would have been better omitted.

AUSTRALIA IN WORLD AFFAIRS.

"AUSTRALIA IN WORLD AFFAIRS" is the second volume of addresses made by the Right Honourable H. V. Evatt, M.P.[3] Several of the addresses are in connexion with the United Nations Organization, and from them the reader can gain an insight into its machinery, and into the role played by Dr. Evatt at the international conferences held during the years 1945 and 1946. Dr. Evatt ably expresses his views on such subjects as territorial trusteeship, security in the Pacific, the future of the Pacific and international affairs. Few will dispute his statement, made in an address on Australian-American trade, to the National Trade Council, that "true prosperity is both indivisible and all-pervading".

[1] "Infant Feeding", by V. L. Collins, M.D. (Melbourne), M.R.C.P. (London), D.C.H. (London); Fourth Edition; 1946. Melbourne: W. Ramsay (Surgical) Pty. Ltd. 8¾" × 5¾", pp. 74. Price: 4s. 3d.

[2] "These Small Glories", by Jon Cleary; 1946. Sydney, London: Angus and Robertson Limited. 7¼" × 4¾", pp. 150. Price: 6s.

[3] "Australia in World Affairs", by the Right Honourable H. V. Evatt, M.P., with a foreword by the Honourable Sir Frederic W. Eggleston, Kt.; 1946. Sydney, London: Angus and Robertson Limited. 8¾" × 5½", pp. 228. Price: 10s. 6d.

The Medical Journal of Australia

SATURDAY, DECEMBER 28, 1946.

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THE SCHOOL MEDICAL SERVICES OF AUSTRALIA.

DURING the last few years the value of school medical services in this country has been widely recognized. Though, as recently pointed out in these columns, the pre-school child is not seen by many persons to offer wide scope for the practice of preventive medicine, the school child is looked upon as coming within its purview. This attitude has developed largely because something is done for the child who goes to school—the visits of school doctors on their rounds of inspection have become part of the school business and certain children are known to have derived benefit when advice given by the doctors has been followed. There are doubtless many parents who would not stop to consider that school years are years of susceptibility, that they cover a period when children easily fall victim to infectious disease and when rapid growth takes place. They easily appreciate, however, that something is wrong if the child cannot go to school. We may then conclude that the success of a school medical service is the best form of propaganda that the service can have. That the provisions made for the service differ in the several States will be clear from the short description that is published on another page in this issue. Though in most States the general set-up leaves little to be desired, there is no single instance in which staffing is sufficient for the work that is waiting to be done. In some cases this is no doubt partly the result of disturbance connected with the war, but generally speaking shortness of staff is a sign of official unwillingness to do the job properly. It will be stated by experts in the subject that education in Australia is run on a starvation footing, not only in the matter of buildings and equipment, but also in regard to the number of teachers and their remuneration. With this we shall readily agree; but medical people who have any interest in the matter cannot do other than point to the fundamental need, from the wide national point of view as well as from that of the individual, for the existence of healthy bodies and healthy minds among the children who are to be taught. As a matter of fact, the contentions of the educationists and of the medical experts should not be treated as separate matters. A good deal of publicity is given from time to time to the views of teachers on the deplorable conditions in which many of them are compelled to work. Not so much is heard of what school medical officers think should be done to make their efforts really effective. For this reason we wish to draw attention to a conference of these officers which was held at Canberra on May 27 to 29, 1946. A short report of the meeting is published as an appendix to the report of the twenty-first session of the National Health and Medical Research Council.

The meeting, which was held concurrently with the meeting of the National Health and Medical Research Council, was the first conference of school medical officers held since 1929. It was attended by Dr. L. St. Vincent Welch (Queensland), Dr. H. M. North (New South Wales), Dr. Mary Lane (Victoria), Dr. W. Christie (South Australia), Dr. E. M. Stang (Western Australia) and Dr. C. L. Park (Tasmania). The chair was taken by Dr. F. W. Clements, director of the Institute of Anatomy, Canberra, who acted on behalf of Dr. A. J. Metcalfe, acting Director-General of Health, the convenor of the meeting. Seven resolutions were adopted. The first had to do with child health surveys and research projects. In the preamble to this resolution the conference recommended that the National Health and Medical Research Council should be asked to examine the possibility of making certain research facilities available, with the object of providing authoritative information to those responsible for the carrying out of physical education and health programmes for school children. Six problems were discussed; they had been dealt with at a conference of supervisors of physical education in State education departments. The first was the effect upon adolescent girls of gymnastic performance in the post-primary physical education programme, with special reference to jumping and competitive athletics. This was deferred for consideration at a later meeting, one reason for this action being the fact that the investigation would be lengthy and should not be undertaken without careful planning. The second problem was the effect upon child posture and health of seating accommodation at present provided in government schools. It was decided that a survey should be undertaken in each State on a uniform pattern to determine the incidence and type of postural defects. The third matter was the establishment of standard tests for the measurement and growth of Australian children. Here it was resolved that surveys should be made on a standard plan provided by the Commonwealth Department of Health, and that the department should be asked to arrange for statistical treatment of the data when obtained. The fourth problem concerned the length of the school day at the various age levels and under varying climatic conditions, and the relation of rest periods to physical and mental fatigue and general school health. This question was referred to a conference of school inspectors. The fifth problem had to do with the effect of certain types of clothing, footwear, school bags and cases upon posture and general health. It was decided that the effect of the carrying of bags should be incorporated in the posture survey, but that the other aspects

of the problem should be discussed later when the results of the posture survey had been reviewed. The sixth problem comprised the development of puberty and its possible implication in the physical education programme under varying climatic conditions, especially in the case of girls. As a report on this subject had been issued in England it was resolved that the findings should be sent to physical education supervisors. The second resolution dealt with mental hygiene in relation to preventive medicine and education. It was held that the mental hygiene aspects of preventive medicine should be a "major consideration" in national health policy. The conference recommended *inter alia* that the Commonwealth Department of Health should set up a division concerned with mental hygiene. It was also resolved that steps should be taken to establish demonstrations in primary schools run on lines which emphasize the healthy emotional and physical development of the child, as is done in the case of the pre-school child at Lady Gowrie centres. Another recommendation was that the school leaving age should not be raised until adequate facilities have been provided in the superprimary grades for children who are not adapted to book learning. In connexion with this mental hygiene resolution it should be noted that the conference had presented to it a paper on psychological problems in school children by Dr. Vincent Johnson, of the psychiatric clinic in the Victorian Department of Health, who attended by special invitation to read the paper. A short abstract of Dr. Johnson's paper appears on another page in this issue. The remaining five resolutions adopted by the conference dealt with (*a*) the coordination of State agencies concerned with the health of the school child, (*b*) the planning of school buildings, (*c*) physical education in university degree courses in education, (*d*) health education in schools and teachers' colleges, (*e*) preventive gymnastics and the training of teachers of physical education in preventive gymnastics. In regard to the planning of school buildings it seems reasonable that the school medical service should be associated with the education department in the choice of school sites, and that it should have the opportunity of discussing plans for new schools with the department and with the government architect. We also agree that the whole subject of health education in schools and teachers' training colleges should be investigated and that this investigation should be the combined responsibility of the education authorities, health departments and school medical services. Perhaps the greater responsibility should be vested in the two last-named bodies.

From this short account of the resolutions adopted at the conference it is clear that the members were able to take a wide and objective view of their subject. They dealt with the matters before them as though they had no difficulties of staffing and inability to complete the work that needs to be done. This was probably the right attitude to adopt, since matters of staffing and questions that go with it are the concern of the State authority. It might strengthen the hands of the heads of services in their requests for increased staff if at a future conference a statement was made regarding the desiderata in the matter of medical inspection of schools; but this ought not to be necessary. As far as we know there are at present no obstacles in the way of the provision of treatment for any defects discovered in school children. There should also be no difficulty in securing the services of suitable medical graduates for school medical work; if difficulties do arise they probably are those of conditions of service.

Current Comment.

VITAMIN DEFICIENCY IN PERNICIOUS ANÆMIA.

RECENT studies in the action of folic acid in the treatment of pernicious anæmia have had a wider importance than the alleviation of the disease in respect of its perversion of blood-forming function. Of course, it has been realized for a long time that there were certain affinities between pernicious anæmia and sprue, and also the peculiar macrocytic anæmia of some tropical countries. Although there is no apparent connexion, it is also interesting to observe that among the many drugs which may have a toxic effect upon the bone marrow, there is at least one, the sulphonamide group, whose action is bound up with para-aminobenzoic acid, which has a nutritive accessory function. The many animal experiments in which hæmatopoietic disturbances can be produced by creating a dietetic deficiency point the same way. It is strange that more elaborate studies have not been made in greater numbers to establish the vitamin levels in cases of pernicious anæmia. David Cayer, Julian M. Ruffin and W. A. Perlzweig, in presenting a study of eight such patients, remark on the dearth of similar researches.[1] Their series of eight patients were proved to be suffering from pernicious anæmia by laboratory investigation and were contrasted with two other groups, one a number of patients diagnosed as suffering from a deficiency of the vitamin *B* complex, the other a group of normal healthy students. All the patients were placed in hospital and given a diet of 2,500 Calories, correctly balanced except for a low level in vitamins. The levels of vitamins *A* and *C* were determined by standard methods, and vitamin *B* complex was estimated by urinary titration before and after test doses of thiamin, niacin and pyridoxine. No evidence was found of any deficiency of vitamins *A* and *C* that could be regarded as significant. Low readings were found in a few members of each test group; for example, there was an apparent absence of vitamin *C* in the plasma in a few, but these were equally distributed through the three groups. A deficiency of thiamin was found in the two first groups, but not in the normal controls, and the same finding was recorded for riboflavin, but no significant difference was detected in the pyridoxine levels of any group. The authors point out that certain signs and symptoms seen in pernicious anæmia often resemble closely corresponding conditions found in patients with a frank deficiency of the vitamin *B* complex. These are glossitis, cheilosis, papillary atrophy of the tongue and paræsthesiæ of the extremities. It is known also that the severity of such symptoms and the degree of the anæmia do not of necessity run parallel. Reports have been made of relief of these symptoms being obtained without alteration of the blood picture. In the authors' series it was found that the anæmia and the other symptoms mentioned did not exist in comparable severity in the same patient. Incidentally it was remarked that although the individuals with pernicious anæmia showed a certain lowering of the plasma level usual for vitamin *A* and of the carotene level, the depletion was not comparable with that found in sprue.

With regard to a deficiency of the vitamin complex in pernicious anæmia, it is known that in some cases the older and, from one point of view, crude liver extracts are more effective than the more concentrated and purified preparations. The action of the latter is presumably on blood-forming function only or chiefly, while the less refined extracts may supply some of the coincident

[1] *The American Journal of the Medical Sciences*, August, 1946.

deficiencies. At any rate, it would appear that the picture is perhaps not so simple as it sometimes appears to be, and further accurate studies along these lines would place knowledge on a more satisfactory basis. It is not suggested that the patient with pernicious anæmia is to be subjected to elaborate analyses of this kind, but it might be possible to establish more firmly the principles involved. It would be strange indeed if any deficiency, hæmatopoietic or otherwise, was single in any one case. It looks as if the doctor of the future, indeed if not at the present, would be wise to use the diagnostic label he attaches to any patient's condition for filing systems and the patient's information and perhaps satisfaction also, but not necessarily as a complete indication for treatment.

TETANUS FROM INFECTED TALC.

THE cases of tetanus recently recognized in New Zealand as arising from infected talc emphasize the risk of this disease even in unexpected circumstances. *Tetanus neonatorum* is a deadly type of infection, fortunately very rarely seen now. H. C. Tremewan reports from the Department of Health of New Zealand the details of the investigation of the fatal illness of three babies within a fortnight in Auckland.[1] After the first two cases all the circumstances were carefully considered. It did not seem at all likely that there had been any slip in the aseptic technique adopted in the care of the umbilical stump; admittedly it was septic in each case, but all dressings had been autoclaved. One child had been circumcised, but the surgical wound was clean. Both babies were about a fortnight old. The only common factor was the talc used in the routine toilet of the infants. Two brands of powder were found on investigation to be made from talc imported from India in unlined jute sacks, and the process of manufacture consisted of a simple mixing with a perfume and a small proportion of boric acid. A week later a third case occurred, and in this also one of the same brands of powder had been used since the baby's birth a week previously. Tremewan points out that the British Pharmaceutical Codex lays down the method of sterilization of surgical talc as boiling, followed by washing and drying. Despite the prompt administration of antitetanic serum and penicillin all three babies died. The case histories are published by Ross Jones, who mentions specially the high degree of muscular spasm in each child and also the hyperpyrexia.[2]

The remaining link in the chain of evidence was to prove the presence of tetanus spores in the suspected talc powder, and this was done successfully. S. Hills, from the Pathological Department of the Auckland Hospital, in reporting the results of bacteriological examination of the material, comments on the sources of talc.[2] As this form of the silicates of magnesium is found in natural deposits which are quarried or mined, it is not surprising that contamination with tetanus may occur. In any case the incidence of infantile tetanus is high in India, though this is more because of primitive hygiene and ignorant midwives than for any other special reason. Hills remarks that the sites where talc and similar commercial forms of magnesium silicate are obtained have been used over a very long period of time and must be defiled by the unheeded droppings of man and beast. Samples of French chalk arriving in New Zealand in previous years have been found to be infected with the spores of *Clostridium tetani*. Cultivation of the specimens of talc by the method of Fildes was successful in isolating the organism. It is pointed out that the so-called classical appearance of the "drumstick" bacteria is a misleading description, for the appearance of spores in a culture is by no means certain, as it depends on several factors, including the selection of culture medium. A culture may consist of filamentous forms, and yet produce a subculture of sporing forms. The organisms were proved to be virulent for animals, though even this may not necessarily be demonstrable in cultures obtained from patients dying of the disease. Swabbings from the umbilicus were also examined from each baby, but no isolation cultures of tetanus were successfully made, although suspicious organisms were seen in the original cultures on primary enrichment media. Prompt steps were taken after the disease was recognized to withdraw the suspected powder from the market, and appropriate precautions for sterilization were instituted. It is yet another instance of the debt to medicine that is owed by a community which is usually unaware of the dangers from which it is constantly being protected.

[1] *The New Zealand Medical Journal*, August, 1946.
[2] *The New Zealand Medical Journal*, October, 1946.

DENTAL SURGEONS AND MEDICAL PRACTITIONERS: A MATTER OF RESPONSIBILITY.

AN editorial in *The Australian Journal of Dentistry* for November, 1946, deals with a matter that is as important to medical practitioners as it is to dentists. The Council of the Victorian Branch of the Australian Dental Association received a complaint from a medical practitioner in a "near suburb" stating that he had received two urgent calls from patients of dentists. One was suffering from an infection following the extraction of teeth and the dentist was not available during the week-end. The other patient called the medical practitioner late one morning during the week because he was suffering from hæmorrhage. The patient had called the dentist, who replied that if the patient could not be brought to Collins Street he should see his own doctor. The editorial takes the dentist to task for shirking his responsibility. The Council of the Dental Association holds that a dentist must be responsible for the after-treatment of his patients. Should he not be available it is his duty either to provide a substitute or to ask a medical practitioner to attend the patient. A patient should be warned by the dentist of any possible complication so that he may be consulted if an emergency arises. "To instruct a patient to consult a medical practitioner in these circumstances is not only an impertinence, but a dereliction of duty." The duty of the medical practitioner is clear. First of all, unless the condition is urgent and demands immediate treatment, he should try to establish contact between dentist and patient that the dentist may undertake the treatment. Failing that, he will treat the patient, but will make it clear that he is acting for the dentist. He will as soon as possible inform the dentist of what he has done and transfer the patient to his charge. He must not assume that the dentist has shirked his duty.

THE RETIREMENT OF DR. N. G. HORNER.

AT the end of this year Dr. N. G. Horner will retire from the editorship of the *British Medical Journal*. He has been associated with that journal since 1917, when he left the staff of *The Lancet* to become assistant to the late Dawson Williams, who was Editor of the *British Medical Journal*. He succeeded Dawson Williams in the editorial chair in 1928. Since that time the world has passed through anxious and turbulent periods. In spite of the anxieties of the financial depression and the grimness of war with the enemy close at hand, the *British Medical Journal* appeared regularly and bore living witness to the courage of the British people and to the objects of the British Medical Association. In his control of what we have chosen to call the Parent Journal Dr. Horner has shown wisdom and ability and has earned the gratitude of the members of the Association in every part of the world. His relations with THE MEDICAL JOURNAL OF AUSTRALIA have been most cordial. At the Annual Representative Meeting in July, 1946, the hope was expressed that in the leisure of retirement Dr. Horner would find renewed health and strength. This hope will find an echo in the hearts of many Australians.

Abstracts from Medical Literature.

PÆDIATRICS.

"Prostigmin" in Pædiatrics.

GUY A. TITTLE (*Texas State Journal of Medicine*, September, 1946) discusses the use of "Prostigmin" in pædiatrics. "Prostigmin" is a synthetic compound resembling physostigmine (eserine). Its pharmacological effect is vagotonic, but it usually produces no side reactions. It inhibits the destruction of acetylcholine by cholinesterase. It also has a mild depressant action on the spinal cord. The conditions in which its use has been recorded are *myasthenia gravis*, poliomyelitis, infantile cerebral paralysis, deafness and contiguous nerve disorders, hearing loss and tinnitus, spastic cerebral palsy *et cetera*. The author briefly reports fifteen of his own cases in which he has tested the use of "Prostigmin", with the following results. (i) Five patients suffering from acute anterior poliomyelitis were treated with "Prostigmin" in conjunction with other general nursing measures. Muscle spasm was never severe. Four patients recovered completely; one has residual mild unilateral shoulder drop. (ii) Seven children suffering from spastic manifestations were treated; in all cases some improvement occurred, and in six cases the improvement was considerable. (iii) Two girls suffering from congenital deafness, who were already undergoing speech training, were treated with "Prostigmin". The first, aged four years, was thought as a result to show some acceleration of speech activity, but no conclusive evidence concerning improvement in hearing was available. The second, aged eight years, showed undoubtedly improved hearing. (iv) A girl, aged 2·5 years, suffering from Little's disease, was treated with "Prostigmin". She showed some slight improvement, but the prognosis is doubtful. The author admits that his results are limited and not particularly promising; but he believes that they show that "Prostigmin" should be worth consideration in pædiatric cases in which previously there had been practically no promise. He is of the opinion that real and lasting results will be manifest after the lapse of several more months of treatment. He does not deny that possibly the majority of afflicted children will derive no benefit.

The Treatment of Cœliac Disease with Vitamin B Complex and Liver Extract.

ERIC C. ALLIBONE (*Proceedings of the Royal Society of Medicine*, September, 1946) records his results of the treatment of cœliac disease with vitamin *B* complex and liver extract. He names several workers who have carried out investigations with these therapeutic agents. Among them were May, McCreary and Blackfan, who in 1942 reported that by giving liver extract parenterally and vitamin *B* complex they had obtained rapid clinical improvement in patients suffering from cœliac disease, together with an increase in the absorption of vitamin *A*; they kept the patients on a normal diet. The author has used the same preparations as were used by May and his co-workers. He investigated 23 cases. After initial investigations he gave daily intramuscular injections of vitamin *B* alternating with liver extract. The duration of the course was three weeks in the first fifteen cases and six weeks in the remaining eight. The patients were then given the medicaments by mouth, the oral course lasting between six months and a year. Whenever feasible an ordinary ward diet was given. Two of the patients died. One of these had recurrent attacks of bronchitis and contracted fatal pneumonia; permission to perform autopsy was refused. The second patient, while on oral therapy, suffered a relapse with diarrhœa followed by general weakness and death. Of the remaining eighteen patients, six had to be put on a fat-free diet at the end of the course of parenteral treatment. Another four were changed to a diet with a low fat content after six to twelve months of oral treatment. Eight patients were well enough to remain on an ordinary diet. The author's conclusion is that the administration of high doses of vitamin *B* and liver in cœliac disease "ameliorates the strictures of the dietary treatment in the milder types". In the more severe cases a less easily demonstrable benefit is obtained. From the accumulated data there is no evidence that this form of treatment is specific.

Sudden Death Associated with Congenital Cardiac Defect.

D. R. MEHRING (*Clinical Proceedings*, July, 1946) reports the case of a female child, one of twins, who died suddenly at the age of three months. The child had been cyanosed at birth and slight cyanosis had persisted. At the age of two and a half months she turned dark blue in a fit of crying and had a convulsive seizure. After this she was well until her sudden and unexpected death. At autopsy the following findings were recorded: pulmonary atresia and patent *ductus arteriosus*, dextroposition of the aorta and intraventricular septal defect, hypertrophy of the right ventricle, hypoplasia of the left chambers of the heart and abnormalities of the veins. A striking feature was a persistent left superior *vena cava*; there was also a single left pulmonary vein. The disposition of the great vessels allowed only inadequate oxygenation of the blood in the lungs. In the absence of a functioning pulmonary trunk the blood was being conveyed to the pulmonary circulation via the *ductus arteriosus*, a vessel with a diameter approximately one-sixth that of the aorta. Even if compensatory enlargement of the bronchial arteries took place, the amount of blood delivered to the pulmonary capillaries must have been extremely inadequate. In addition, such blood as was aerated in the lungs was freely mixed with venous blood issuing from the right ventricle into the aorta, to be supplied to the coronary arteries and the systemic circulation. This explains the child's cyanosis from birth. Referring to the cyanosis, the author states that in an uncomplicated case of Fallot's tetralogy cyanosis is generally manifest early, but usually not from birth, and rarely it may never appear. The factors in its production are chiefly (i) a veno-arterial shunt and (ii) increased deoxygenation in the tissues. In conclusion the author calls attention to the number of congenital malformations in the patient's heart: (i) a variety of the tetralogy of Fallot, (ii) anomalous aortic branches, (iii) a patent *ductus arteriosus*, (iv) a diminutive left atrium and (v) a defect of the great veins. The first three often occur together, and the tetralogy may at times be found along with coarctation of the aorta and a right-sided aortic arch; but the coexistence of Fallot's tetralogy with defects of the left atrium and veins is unusual.

Rheumatic Encephalopathy.

DUNCAN LEYS (*Edinburgh Medical Journal*, August, 1946) calls attention to the occurrence of encephalopathy in acute rheumatism. His clinical material consisted of three girls, two aged fourteen years and one aged twenty-one years; the last-mentioned and one of the preceding two had a psychosis indistinguishable from schizophrenia, this diagnosis being made by psychiatrists. All the patients recovered. The author points out that psychotic symptoms of all degrees of severity occur in chorea. In general the mental symptoms run parallel to the choreic motor symptoms. The outstanding characters of schizophrenia in rheumatism are withdrawnness, negativism, catatonia and coma, and they are not easily mistaken. Acute rheumatism is endemic in Great Britain. It has familial characters for which studies suggest a twofold basis, hereditary and epidemic. It is associated with poverty, it has a seasonal variation in incidence with the peak in the winter, and it is characterized by annual variations in frequency. It is relatively rare in the Scottish Highlands. The year preceding the occurrence of the author's three cases was one with a high rheumatic rate and a high prevalence of meningo-encephalitis. The author suggests that the three girls suffered their peculiar illness because their puberty coincided with a period, not only of prevalence of rheumatism, but also of prevalence or "enhancement" of pathogenic neurotropic virus. These two factors may be identical. Chorea or rheumatic encephalopathy seems to be much modified by the age, sex, constitution and experience of the subject, and possibly by endocrine or biochemical factors, since it is known to be frequent during puberty and pregnancy and is rarely if ever observed among men. Alternatively, the rheumatic infection may be regarded as a precipitator, in favourable circumstances, of an emotional crisis or tangle which was latent and which may be perpetuated.

Poliomyelitis in Mauritius.

A. M. MCFARLAN, G. W. A. DICK AND H. J. SEDDON (*The Quarterly Journal of Medicine*, July, 1946) present the results of an investigation of an epidemic of poliomyelitis that occurred in Mauritius in 1945. There were 800 cases during the month of March, and at least 1,018 cases occurred altogether. The incidence was 2·4 per 1,000 of the population, and the mortality rate was about 6%. The incubation period was eight to fourteen days. In only 23 families was more than one case recorded. The attack rate during the first year of life was low, from one to five years it was 12 per 1,000, from six to nine years it declined rapidly, and it remained low at later ages. The epidemic began in an urban district, and spread rapidly over the island; the curve had a symmetrical and rather explosive character. A centrifugal spread was observed

along the roads of two rural districts; healthy adult males appeared to act as carriers. The results of investigations indicated that the chief factor in the spread of infection was human contact. The epidemic began soon after a cyclone had caused much damage and at a time when intestinal diseases were increasing in prevalence. The authors suggest that the endemic poliomyelitis virus was modified and became more pathogenic and more invasive. The rapidity of the spread of infection, and the character of epidemic curves for the whole epidemic and for individual towns and villages, suggested spread by transient carriers who had become infective a few days after exposure. A carrier epidemic apparently spread rapidly among adults and children; this was followed about a week later by a much smaller epidemic of clinical poliomyelitis. The authors think it probable that the presence of the virus in the pharynx of patients and carriers was at least as important for the spread of infection as was its presence in the fæces.

ORTHOPÆDIC SURGERY.

The Operative Treatment of Decubitus Ulcer.

EDMUND J. CROCE *et alii* (*Annals of Surgery*, January, 1946) present a method of primary closure of decubitus ulcers in young paraplegic casualties. The authors consider that the old approach to the treatment of decubitus ulcer in young patients is entirely inadequate because of the time required (six to twelve months) for the complete epithelialization of a large sacral ulcer and because the end result is thin unstable epithelium overlying the bony structure of the sacrum and coccyx with but a thin layer of fibrous tissue intervening. The authors found that after excision of the ulcer, it was possible by the simple expedient of raising full thickness flaps on each side of the ulcer to rotate these flaps centripetally to cover even large defects. The extent of the surgery required to raise flaps extensive enough to close the larger defects was found to be rather great. The authors consider that the patient is ready for operation when he has fully recovered from spinal shock, when he has exhibited a distinctly positive nitrogen balance for several weeks, when the ulcer is free from clinical signs of acute inflammation, when its base is covered with healthy granulation tissue free from sloughing fascia and its margins are fixed and circumscribed with invading epithelium, and when cultures are free from *Streptococcus hæmolyticus* and *Staphylococcus aureus*. Before closure and after final and complete hæmostasis a liberal amount of plasma-penicillin powder is evenly distributed over the wound surfaces. The wounds are as a rule completely healed in one month. The operation is a major plastic procedure, and should not be attempted in the treatment of a debilitated patient.

A Method of Treatment of Chronic Infective Osteitis.

IVOR M. ROBERTSON AND JOHN N. BARRON (*The Journal of Bone and Joint Surgery*, January, 1946) suggest that in the treatment of certain patients with chronic osteitis the whole of the diseased area, skin, soft tissues and bone, should be removed in order to establish normal conditions in the tissues. This method of treatment cannot be considered as a method of treatment for chronic osteitis in general. The infected area should be accessible to surgical approach, and the site and extent of the disease should be such that a complete excision of the area is possible. The authors remove all diseased tissue and then apply a split skin graft to the wound surface. About four weeks after this operation the second stage, the plastic repair of the soft tissues, is undertaken. The split skin graft is removed and the area is covered by a skin and subcutaneous tissue flap; muscle is included where necessary. In certain cases repair of the bone defect with cancellous chips from the ilium is carried out at the same time as the reconstruction of the soft tissues. In chronically infected compound fractures and gunshot wounds in which a substantial gap exists between the bone ends, bone grafting is not attempted until at least six weeks after the operation for reconstruction of the soft tissues. In these latter cases an onlay graft is used to provide fixation, and cancellous chips are packed between the bone ends. The authors consider that it is important also that strips of cancellous bone should be slotted into the upper and lower fragments so that a thin bridge of cancellous bone is formed between the bone ends. Penicillin is used for twenty-four hours before operation at each stage, and its use is continued for four days after operation; 100,000 units each twenty-four hours are given by the intramuscular drip method.

Secondary Closure of Wounds.

GILBERT J. MCKELVEY (*The Journal of Bone and Joint Surgery*, April, 1946) advocates the early secondary closure of wounds following saucerization for chronic infection of bone. The author has found that saucerized wounds on the arm, forearm, thigh, buttocks or shoulders lend themselves to satisfactory suture, whereas those on the foot or leg or in the region of the elbow or knee can be treated more satisfactorily by skin grafting. From a period of forty-eight hours before operation patients are given 25,000 units of penicillin systemically every three hours and 1·5 grammes of sulphadiazine by mouth every six hours. At operation the sinus is injected with equal parts of methylene blue and hydrogen peroxide. If possible, a tourniquet is applied and the entire dyed area is widely and meticulously saucerized. Great care is taken to excise all scar tissue and overhanging ledges of bone or soft tissue. One or more lengths of soft rubber tubing with a lumen of one-eighth of an inch are then inserted into the depths of the wound. The tubing is transfixed to the skin by suture. The wound is packed with plain gauze. The extremity is placed in plaster, and the tubes are brought through the plaster to the surface. Antibiotics are continued systemically as before operation. Penicillin is also injected in solution into the tubes twice daily in quantities of 3,500 to 12,000 units. On the eighth day after saucerization a window is cut in the cast and the packing and tubing are removed. At this time the decision is made whether the wound will be treated by skin grafting or by secondary suture. After the first dressing, packing which has been soaked in half-strength Dakin's solution is inserted in the wound. This packing is changed daily until secondary suture is performed, usually on the tenth day. At this operation the skin edges and the granulating walls of the cavity are resected. An effort is made to obliterate dead space. Layers of muscle and fascia are closed with interrupted sutures of fine chromicized gut. The skin is widely undercut to allow closure without tension in the suture. Antibiotics are resumed in doses similar to those given before and after saucerization and continued for at least one week. The author found that of 55 wounds treated by this method, 70% healed primarily and a further 15% healed in one month. The author does not consider that any of his cases could be classified as a complete failure.

Condylar Movement in the Study of Internal Derangement of the Temporo-Mandibular Joint.

MICHAEL BURMAN AND SAMUEL E. SINBERG (*The Journal of Bone and Joint Surgery*, April, 1946) state that each condyle of the mandible normally leaves its socket when the mouth is opened between one-quarter of an inch and three-quarters of an inch. Because condylar advance is equal and even, the chin does not normally shift to either side. If because of pathological conditions asynchronous condylar movement occurs, condylar advance will be unequal and the chin will always shift away from the side of greater condylar movement. The authors state that normal lateral motion of the mandible involves the anterior movement of one condyle with the synchronous posterior movement of the other. In normal right lateral movement, the right condyle moves backward and the left condyle moves forward. If the advance of one condyle has been stopped, for example, by meniscal block, lateral movement is greater towards the side of involvement. If the retreat of a condyle has been blocked, the greater lateral movement is away from the side of involvement. The authors consider that by analysis of jaw movement, it is possible to determine which joint is involved and whether the condyle on the affected side is in or out of its socket. It is usually an interposed meniscus which stops condylar advance or retreat. The trauma which causes loosening or tear of the meniscus may be either intrinsic or extrinsic. The onset of disability in intrinsic trauma is gradual or sudden, and one characteristic observation is the aggravation or onset of acute disability in the morning, after the jaw has been relaxed during sleep. The common causes of intrinsic injuries are yawning, chewing, talking, the dropping of the jaw in sleep, dental malocclusion, and prolonged mouth opening as in dental work. Three groups of cases are described in which the interposed meniscus can stop the condyle from leaving its socket: (*a*) the untreated joint which is cured spontaneously, (*b*) the untreated joint in which secondary arthritic changes develop as a result of long fixation, and (*c*) the fixed joint which is released by operation. Operation should be performed under local anæsthesia for two reasons: (i) to see if normal mouth opening is restored after resection of the blocking meniscus and thickening capsule and ligaments, and (ii) to have the reassurance that the branches of the facial nerve have not been injured.

British Medical Association News.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and have resumed civil practice as from the dates mentioned:

Dr. J. P. Gallagher, 57, Victoria Street, Burwood, New South Wales (August 5, 1946).
Dr. Loris Blashki, 37, Station Street, Guildford (December 1, 1946).
Dr. F. T. Humphery, Deniliquin, New South Wales (October 10, 1946).
Dr. R. E. Maffey, c.o. Dr. W. T. Nelson, 141, Macquarie Street, Sydney (November 26, 1946).

Public Health.

THE MEDICAL EXAMINATION OF SCHOOL CHILDREN.

THE leading article in this week's issue deals with the medical examination of school children by departmental medical officers. In order to clarify the subject the following information, gathered from data supplied by medical heads of departments, is published. The information is not in all cases complete, but will suffice to show how the matter is regarded officially in the several States.

Queensland.

Up till 1926 the school health services in Queensland were non-existent. They were developed after the appointment in that year of Dr. L. St. Vincent Welch as chief medical officer of the Department of Public Instruction. For some years now the work has been under the control of the Minister for Health and Home Affairs.

There are in Queensland some 154,000 children in primary schools receiving instruction at the hands of approximately 5,000 teachers in 1,700 schools. There are also 214 denominational schools whose gross enrolment totals 36,350 pupils, taught by 1,460 teachers. The work of the school health services is carried out by the following staff: the chief medical officer, a staff medical officer, a chief dental inspector of schools, 16 dental inspectors, one part-time dental inspector, 21 nursing sisters, one part-time ophthalmic surgeon, one part-time school medical officer, 24 part-time ophthalmic officers. It will be noted that medical officers are conspicuous by their absence. It was decided early in the history of the work to employ officers, who, while capable of detecting signs of physical ill health, would nevertheless make no diagnosis. Fully trained hospital nursing sisters, with certificates in general nursing, midwifery and child welfare, were therefore chosen for the work. The school sister makes a complete survey of all the children and she recommends that any child showing a departure from sound health shall be taken by its parents to the family medical adviser for an overhaul. It is held that in this way members of the medical profession are drawn into close contact with school health work. On the forms sent to the parents on the recommendation of the nursing sister there appears the following statement.

> The practitioner to whom the child is taken is requested to state fully what treatment, operative or otherwise, has been instituted, and to attach his signature. He is also cordially invited to offer any suggestion which may be for the child's benefit.

It has been found that parents are realizing the importance of the medical examination and are having remedial measures carried out wherever necessary.

The part-time ophthalmic officers are stationed in different centres in the State (chiefly in the western areas), and their duty is to examine, diagnose the condition responsible for, and carry out treatment of, infected eyes, and to notify cases of trachoma so that when necessary treatment may be undertaken at the Wilson Ophthalmic School Hostel.

The Dental Section consists of a chief dental inspector, who is under the general supervision of the Chief Medical Officer of the School Health Services, and sixteen fully trained dental officers. In addition there is a part-time dental officer who attends to the needs of the Wilson Ophthalmic School Hostel and the Blind and Deaf School. The duty of the dental inspectors is to examine the teeth of all children in the State and denominational schools, and where no dental clinic under the control of the Brisbane and South Coast Hospitals Board is established, to carry out prophylactic treatment, such as scaling and superficial fillings. Children eligible for free dental treatment are those whose parents receive the basic wage or less. Children not coming within this category are also examined and their parents are advised to take them to their own dental officer, with one proviso—all children, whether their parents are on the basic wage or above it, are entitled to dental treatment by a dental officer of the service if they attend a school in a district in which there is neither resident nor visiting dentist. Certain districts are served by (*a*) rail dental clinics and (*b*) road dental clinics. These units are equipped in a modern and complete way.

This service is apparently complete. It is, however, interesting that in his evidence before the Parliamentary Joint Committee on Social Security, Dr. St. Vincent Welch, the chief medical officer, pointed out that his staff had been depleted by war conditions. He also added that, even at full strength, it was entirely inadequate to cope with the demands which the school health services placed upon it.

Two further points should be mentioned. In the first place, as a result of representations made to the Government, a pound per pound subsidy has been approved for the purchase of equipment by school committees suitable for the distribution of milk or food for children at schools. Secondly, it is anticipated that eventually a section under a dietitian will be established in the Department of Public Instruction for the purpose of providing a midday meal for all children during the five-day week while they are attending school.

New South Wales.

The school medical service in New South Wales is under the control of the Director-General of Public Health. In addition to the work of school medical examinations, certain officers of the service have to devote time to child guidance clinics, to medical work of the Child Welfare Department, and to work at the Teachers' College. A certain amount of work is also carried out for the following bodies and authorities: Soldiers' Children Education Board of the Repatriation Commission, the New South Wales Society for Crippled Children, Stewart House Preventorium, the Far West Children's Health Scheme, and the Department of Labour and Industry and Social Welfare. The present staff establishment consists of 23 medical officers (including the director of the service)—there are fifteen general medical officers, three medical officers at teachers' colleges and four psychiatrists. The four psychiatrists with four psychologists and four social workers comprise four child guidance clinics. There are twelve school nurses and four speech therapists. There are at present vacancies for one psychiatrist, two oculists and three speech therapists. Even if these vacancies are filled, the staff available for medical inspection will still be below requirements because of the additional work for which the service is now responsible. This extra work includes, *inter alia*, the examination of teachers for employment and reemployment, and work connected with discharged teacher soldiers resuming after war service, with additional special classes and with increased numbers of children referred for examination by the Child Welfare Department. The introduction of this extra work is regrettable because, as the director of the service points out, the medical inspection of schools is the primary purpose of, and the real justification for, the inauguration of a school medical service. He states that additions to the staff are needed for proposed extended activities. Among these activities are an inspection of all but the smallest rural schools once a year. The additions needed include four men (one an oculist) and four women practitioners. He also thinks that a part-time orthopædic surgeon is required. This would make a total of 31 full-time medical officers and one part-time medical officer in the service. More school courses are also needed. These suggested additions do not include those needed for child guidance clinics.

There is a school dental service which provides a triennial service to schools in the country; children between the ages of six and nine years are treated and emergency treatment is given to children outside this age group. Schools in the "far western" area are visited biennially. In the metropolitan area schools are visited biennially and children between the ages of six and eight years are treated. The present establishment includes eighteen dental officers (nine in the country and nine in the metropolitan area) and eight

dental assistants. Vacancies at present exist for four dental officers. To deal with proposed extensions of work there are needed twelve dental officers and thirty women trainees in the first year of the dental hygienists' course. Proposals for the training and employment of dental hygienists are under consideration and no decision has so far been reached. To give an adequate school dental service in New South Wales, it is estimated that a staff of approximately thirty dental officers and 300 to 400 dental hygienists would be required.

Victoria.

The School Medical Service in Victoria has but recently been transferred to the Department of Health. The Chief Medical Inspector of Schools is responsible to the medical head of the department. The staff of the school service comprises the following full-time officers: seven medical officers (six since November, 1944), eight dental officers (six since January, 1945), eight dental attendants, twelve school nurses (eleven since February, 1945), two disinfectors (one is temporarily employed). Whether this staff is sufficient for the work that should be done, may be judged from the fact that there are in Victoria 293,719 school children (this was the figure for 1944) and that the following work was accomplished in the year 1944-1945. The school medical officers examined 1,566 teachers and 20,038 children—a total of 21,604 examinations. School dentists treated 18,617 children at 23,674 separate visits. School nurses visited 5,144 homes. These figures are taken from the report of the Chief Medical Inspector (Dr. Mary Lane) for the year 1944-1945.

It should be pointed out that the special activities of the service include the examination of children in connexion with schools for the mentally defective and for opportunity grades as well as children referred by attendance officers. There is also a special nose and throat clinic, and recently a remedial gymnasium was brought into being. Special work is also done in connexion with an open air school for children showing signs of delicate health and unsatisfactory physical development.

South Australia.

In South Australia the Principal Medical Officer of the Department of Education (Dr. W. Christie) has a very small staff. He is, of course, a full-time officer and he has four full-time school medical officers who are women and one part-time school medical officer, also a woman. He has also on his staff one dentist and one speech therapist.

Three full-time medical officers are responsible for all the country work involving about 40,000 children, while there are 45,000 in the metropolitan area. Even on the old standard of one examination every three years, it will be seen that the recently enlarged staff will not be able to accomplish the work. On the present standard of an annual examination about fifteen medical officers would be needed in addition to the Principal Medical Officer, whose work is restricted almost entirely to examinations at headquarters. These include the examinations of junior teachers, Teachers' College entrants and a final examination before the teacher commences work after his graduation or after sick leave. In addition, all students taking the Diploma of Physical Education at the University of Adelaide undergo a special medical and physical examination twice each year. The special examinations at headquarters are mostly for eyesight, hearing (lately with an audiometric test) or with an electrocardiograph and physical tests when heart weakness is suspected. Apart from such "office" work, the Principal Medical Officer generally undertakes any special surveys that are required either for research or to provide information, and represents the Education Department on committees such as the Health and Medical Services Committee (Health Department), the Advisory Council for Tuberculosis Services (Hospitals Department), the X-Ray Health Subcommittee of the Adelaide Local Board of Health and the Council of the Illuminating Society of Engineers.

The speech therapist spends only one-half of her time in the Medical Branch and has no assistants. There is only one school dentist for all the school children.

It will be seen that the gaps in this branch are rather conspicuous. Apart from the increased medical staff already mentioned, there should be provision for a complete specialist examination of the sight and hearing of each of the 85,000 school children each year. It would be desirable to extend this to children likely to begin at school the following year. Work done by a physiotherapist in the Adelaide hills, working in conjunction with physical training experts, suggests that there is a need for a large number of such workers. One dentist and one speech therapist can scarcely touch even the fringe of their work. Between 80 and 90 dentists would be required, but the salaries offered are not such as would attract qualified dentists. There are no dental hygienists in this State, the Dental Association in the State being opposed to them, while the number of dentists graduating each year is barely sufficient to make good the wastage in the ranks of practising dentists without making provision for any large-scale expansion.

Another line of expansion desired by the Principal Medical Officer is the employment of trained social workers to visit the children in their homes and discuss health problems with their parents.

Western Australia.

The School Medical Service in Western Australia is under the control of the Department of Public Health. The staff comprises two full-time medical officers and one engaged on half-time duty (one of these appointments was made only this year), three nurses and three dental surgeons.

Tasmania.

In Tasmania the medical and dental services for school children are a function of the Department of Public Health. The staff comprises two full-time medical officers, nine full-time nurses and one nurse engaged on part-time duty. In the dental service there are two stationary clinics, one at Hobart where two dental surgeons and two attendants are employed, and one at Launceston where there are one dental surgeon and one attendant. In addition there are in normal times three mobile dental units, each of which is in the charge of a dental surgeon. At the present time there are two vacancies for dental surgeons to take charge of mobile units. In addition to the two full-time medical officers certain of the fifteen government medical officers who practise in the State carry out school medical examinations in nine municipal districts. In odd districts also (at present in only one) the medical officer of health who is not a government medical officer receives a *per capita* payment for the examination of children in his district.

The aim of the School Medical Service is to examine each child as often as possible during school life. With the present staff it will be possible to see each child every two years at least. The number of school medical examinations carried out during 1945 was 18,502. This means that approximately two-thirds of the children attending school in Tasmania came under the supervision of the service during that year. The service also extends to children attending kindergartens and to those attending primary denominational schools.

In addition to the assistance which the nurses give to the medical officer at the time of examination, regular visits are paid by the nurses to the schools in the districts to which they are attached. During these visits special attention is given to skin and hair conditions, to complaints of ocular defects and to dental defects.

The dental service is available in the two largest cities to all school children, but it is not possible at present, owing to lack of staff, to reach the country districts oftener than once in three years.

At the present time also there is a vacancy for a full-time medical officer and the position has been advertised.

Treatment of defects found at school medical examinations can be obtained free of cost at any public hospital in the State. In practice, parents are advised when defects are found and are recommended to obtain medical advice. The main defects discovered are those connected with teeth, nose and throat, eyes, posture and skin conditions such as scabies and impetigo. Visits from the nurses in the service are useful in securing the treatment of defects, but this is not as satisfactory as is desired.

PSYCHOLOGICAL PROBLEMS IN SCHOOL CHILDREN.

IN the report of the twenty-first session of the National Health and Medical Research Council there appears as Annexure A a paper by Dr. Vincent Johnson, of the Psychiatric Clinic, State Department of Health, Victoria. The paper, which deals with psychological problems in school children, is mentioned in this week's leading article; the following is a short abstract of it.

Emotional maladjustment in childhood is a major factor determining the prevalence of mental and nervous ill health in later life; it is also a factor that is by no means

inevitable. The following statistical findings are taken from reliable American authorities:

(1) Sooner or later, mental disorder incapacitates for a time approximately 10 per cent. of the total population. (Carney Landis.)

(2) The mentally ill account for more than half the hospital beds in the United States and their maintenance costs $166,000,000 annually.

(3) Mental deviations other than psychosis, e.g., psychoneurosis, psychopathic personality, chronic alcoholism, etc., constitute roughly 10 per cent. of the population (14,000,000 of the United States population). (Falk and Hersch.)

(4) 1,700,000 of the men of military age in the United States rejected for military service because of mental ailments or deficiencies during the last war.

(5) Forty per cent. of patients seeking medical advice at public hospital out-patients' clinics are invalided from psychological causes. (Treadway.)

The situation is probably similar in Australia.

The early education of the child (infant feeding, weaning, toilet and habit training, and so on) may create feelings of guilt, fear, anxiety, hostility and resentment, if unwise methods have been used. These feelings may persist throughout life. Feelings and attitudes at first directed towards the parents and the family tend to be transferred to authority and the world to which the older child has to adjust himself. When the child first goes to school, he takes with him these strong feelings, and meets with more anxieties, humiliations and frustrations. The severe discipline, founded on the tradition of training the mind at all costs, ignores the child's emotional needs and personality. Mental hygiene does not support the doctrine of unrestrained liberty in the training and education of the child; it asserts that his "socialization" should not be effected by methods destructive to his sense of security and to his feeling of being loved, accepted and understood. The major emphasis in education should be on making social existence emotionally acceptable to the child, without the production of resentment and hostility, of anxiety and a sense of guilt. It is becoming clear that the vast majority of delinquents and criminals, and of the nervously and psychologically disturbed members of the community who are expressing their repressed anxiety and aggression in physiological symptoms, are the products of the present educational *régime* in the homes and schools. They are expressing in different ways what they suffered in childhood. Present educational practices are based on an archaic conception of human nature as fixed, unchangeable, rational but antisocial. Moreover, the culture which education purports to inculcate, is hardly in a sound and healthy condition at the present time, owing to the developments of modern science and to the economic, social and military catastrophes of our lifetime. Mental health waits upon the reorganization of our culture; but this is no reason why preventive medicine should be idle in the avenues in which it can exert some control over the factors contributing to maladjustment.

Adjustment to the school environment is the second major social adaptation that the child has to make; he is no longer treated as a favoured individual, as in the family circle, but as one of a group in which he has to find his own way and his own level. Particularly has he to match his powers against the learning process. The stress of this adaptation may produce disturbances such as restlessness, irritability, broken sleep, nervous habits and mannerisms. Enuresis may appear; latent epilepsy may become manifest. Stammering appears before the age of eight years in 80% of cases; this suggests that particular stress is placed on the psychic components of the speech mechanism by learning to read and write. Disabilities, which caused no trouble in the child's pre-school activities, and which may not have been suspected, may now become handicaps. Amongst these disabilities are defects of vision and hearing, complete and partial word-blindness *et cetera*. They should be recognized and treated early; otherwise the child may be branded as intellectually retarded, when in fact he is not so. However, it is just as important to avoid undertaking the correction of unimportant departures from normal by vigorous means as it is to be sure to correct important disabilities; in the former case over-enthusiastic treatment may fix the pattern of a psychoneurosis or hypochondriasis in a manner far more injurious to health and efficiency than neglect of the primary symptoms.

The lot of the really dull child is at present hard. Some teachers have difficulty in realizing that the dull child is a crippled child, and cling to "a primitive pedagogical superstition, 'the lazy brain'". Such teachers are "pathogenic agents of major importance"; unintentionally they help to convert handicapped children into unhappy, unhealthy individuals whose personalities deviate progressively towards psychoneurosis, schizophrenia or delinquency. The root of the matter goes beyond the individual teacher to the system of educational administration that praises or blames teachers largely on the success or failure of their pupils at examinations. The dull child who experiences chronic failure in his ordinary class may react by becoming anxious or aggressive; anxiety is the more common manifestation. The usual procedure in these circumstances is progressive loss of self-confidence and self-respect. If the child, at home or at school, is subjected to much sarcasm, abuse and punishment, the psychic and somatic manifestations of chronic anxiety and insecurity develop rapidly, scholastic results become worse, and the syndrome "may assume vicious circle characteristics with severe psychoneurotic symptoms". Truancy and wandering are reasonable reactions on the part of such a child; he has a right to avoid a situation in which he is constantly subjected to torture without justice. In attempts at compensation, he may resort to petty theft, or may "show off", "play the fool" or become a "dare-devil". The dull child, or any other child, who reacts by aggression to his maladaptation in ordinary classes, may apply his feelings of hostility and resentment, not only to the teacher and the school, but to authority and society in general. However, this type of child is in much less danger than the anxious child; he is a nuisance, and is much more likely to come up for psychiatric examination. Cyril Burt gives the figure of 10% for the proportion of intellectually backward children in the school population; the magnitude of the mental and social ill health resulting from the present educational mishandling of such children is obvious.

The general principles of mental hygiene as applied to the education of handicapped children are summarized as follows:

> Placement to eliminate competition with and failure relative to children not so handicapped; the provision of adequate avenues of achievement and self-expression within the capacity of the child; any maintenance of the child's self-esteem and self-confidence at any cost; guidance by positive methods such as commendation and encouragement for acceptable performance and not by negative methods such as ridicule, blame and punishment for inadequacy of achievement; the elimination of pedagogical and parental attitudes and methods ingraining fear, guilt, inferiority, insecurity or hostility.

The gifted child may be as inappropriately placed in an ordinary class as the dull child, and even the child who is normal mentally and physically is not immune from emotional disturbance, if he lacks a sense of security. Occasionally the effect of the emotional disturbance will be to make him appear mentally deficient. Factors in such emotional situations, apart from school conditions, are home conditions occasioning insecurity, such as loss of a parent through death, desertion or divorce, unsatisfactory parent substitutes in the case of illegitimate, adopted or dependent children, psychoneurosis or maladjustment in one or both parents, irresponsibility, authoritarian despotism, emotional frigidity and puritanical rigidity, parental discrimination between siblings, and jealousy between siblings. The over-protected, dependent only child is at a disadvantage in adapting himself to school.

There are no single causes of maladjustment. When medical students are taught psychopathology as well as morbid anatomy and physiology, the medical profession generally will regard maladjustment in childhood in the same way as it views chronic, deep-seated bacterial infection as a menace to health. It will also be alive to the widespread incidence of psychosomatic disease. Preventive medicine needs to pay considerably more attention to mental hygiene. The following recommendations are made:

> Psychogenic disorder knows no frontier, and I suggest that the development of a campaign on a national basis to strike at its root causes is a major obligation of the national health authorities concerned with preventive medicine. This to my mind necessitates two fundamental operations, some preliminary research into ways and means and the organization of educational measures to improve the psychiatric interest and understanding of doctors, health and educational authorities, infant and child hygiene instrumentalities and all the other agencies concerned with child welfare. By such means alone will the crux of the problem of prevention, the education of parents and teachers to better understand themselves, their children and the requirements of healthy emotional growth, ever be grappled with effectively.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 229, of December 5, 1946.

AUSTRALIAN MILITARY FORCES.

Australian Army Medical Corps.

SX34523 Lieutenant-Colonel C. Yeatman, O.B.E., relinquishes command of 130th Australian General Hospital and is placed upon the Regimental Supernumerary List, 28th September, 1946.

NX102477 Lieutenant-Colonel K. A. McGarrity is transferred to the Reserve of Officers (Australian Army Medical Corps), 13th September, 1946.

Reserve of Officers.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates indicated, and on the date prior to such transfer, where applicable, cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers:

2nd/11th Australian General Hospital.—NX146863 Captain J. R. Tonkin, 11th September, 1946.

101st Australian General Hospital (Australian Imperial Force).—Captains NX200861 G. M. Fisher and NX77338 L. H. Joseph, 10th September, 1946.

No. 105 (Adelaide) Military Hospital.—SX26405 Major K. F. Cooper, 17th September, 1946, and Captains SX22304 J. L. Stokes, SX19002 J. S. Jeffries and SX19001 C. M. Gurner, 19th September, 1946.

No. 113 (Concord) Military Hospital.—Captains NX113211 P. C. P. Waugh, 12th September, 1946, and NX170759 A. R. Frith, 10th September, 1946.

17th Australian Camp Hospital.—NX203810 Captain F. W. Harrison, 12th September, 1946.

20th Australian Camp Hospital.—VX111105 Captain R. V. Chong, 20th September, 1946.

72nd Australian Camp Hospital.—NX202635 Captain T. G. Conneely, 10th September, 1946.

103rd Australian Convalescent Depot.—NX70696 Major M. S. Trustcott, 25th June, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains QX60279 G. A. S. Douglas, 19th September, 1946, NX169427 K. J. Byers, NX200446 A. F. V. Musso, NX200857 T. H. MacCulloch, NX201163 L. D. Bertinshaw and NX201400 C. C. Ewart, 17th September, 1946, NX123310 A. D. Shirley, 13th September, 1946, NX201266 J. A. H. Jeffery, 10th September, 1946, and VX92579 J. J. R. Heath, 17th September, 1946.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates indicated, and on the date prior to such transfer, where applicable, cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers and are granted from such date honorary rank on the Reserve of Officers equivalent to the temporary rank relinquished:

2nd/9th Australian General Hospital.—VX138548 Captain (Temporary Major) R. D. Ferris, 14th September, 1946.

101st Australian General Hospital (Australian Imperial Force).—N462582 Captain (Temporary Major) F. Goldschlag, 14th September, 1946.

No. 102 (Holland Park) Military Hospital.—QX30149 Captain (Temporary Major) H. C. Fox, 19th September, 1946.

106th Australian General Hospital.—NX202087 Captain (Temporary Major) J. M. Hercus, 12th September, 1946.

2nd/4th Australian Field Ambulance.—NX76510 Captain (Temporary Major) E. J. T. Giblin, 25th June, 1946.

2nd Australian Out-Patients' Depot.—VX39814 Captain (Temporary Major) S. E. Francis, 17th September, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—NX167015 Captain (Temporary Major) M. V. Mutton, 17th September, 1946.

Retired List.

The undermentioned officers are placed upon the Retired List on the dates indicated with permission to retain their present substantive rank and wear the prescribed uniform. Where applicable they cease to be seconded and relinquish any temporary rank held, with effect from the date of placement upon the Retired List:

NX203622 Captain J. G. O'Neill, 25th June, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—VX95995 Captain R. J. Gough, 14th September, 1946.

Reserve Citizen Military Forces.

5th Military District.—The following officers are placed upon the Retired List with permission to retain their ranks and wear the prescribed uniform, 14th September, 1946: Honorary Major G. W. Barker, Major B. Burnside, Honorary Major F. L. Gill, Major W. H. Godby, Honorary Major H. J. Gray, Majors M. B. Johnson and A. Juett, Honorary Major D. I. R. Smith, Honorary Captain J. C. Bennett, Captains A. R. Bean, R. H. Crisp, G. G. Campbell and K. C. Godfrey.

Correspondence.

LUMBAGO.

SIR: I have read very carefully through Dr. J. H. Young's article on lumbago in THE MEDICAL JOURNAL OF AUSTRALIA, October 5, 1946, on several occasions, and I feel convinced that the subject he is discussing is most assuredly not what the bulk of the profession still regard as lumbago.

Lumbago appears to be a term like sciatica used both in a scientific and a non-scientific form, the former connoting a painful condition of the lumbar muscles and fascia, and the latter, just pain in the back, comparable to the loose use of the term sciatica, meaning pain referred or otherwise over portion of the sensory area of sciatic nerve distribution. From a careful study of Dr. Young's article I am convinced that he nas given the latter interpretation to the term, since I can find no reference in the article to the signs of lumbago in its scientific form.

Lumbago is fairly common, and its onset is acute and sudden and usually occurs after a period of prolonged forward bending. The area of acute tenderness to pressure is small with a surrounding area of lessened tenderness to pressure and is confined to the *erector spinæ* muscles. The supraspinous ligaments and spinous processes are not involved and are not tender. The pain felt extends over a wide area of the lumbar region, on both sides of the midline. Nodules are difficult to palpate if lying deep in the muscle mass.

When the pain felt is in the gluteal area it is better to call it gluteal myalgia. The onset is the same as in lumbago. The acute tenderness to pressure is localized usually to the origin of the *gluteus maximus*. Here the nodules are easily felt. The nodules remain for a considerable time after the pain has passed. My partner has had them, and he regards these nodules as precursors of an osteoarthritis of the spine, sacro-iliac joints or lumbar spine. This can be confirmed by checking the Repatriation medical files for World War I and noting the number of cases of lumbago, myalgia and fibrositis in France that have since developed sacro-iliac arthritis and spondylitis. It is noteworthy that "sciatica" was not common at this time, but lumbago was.

I think a distinction must be drawn between those cases where a definite localized nodule occurs and those cases in which firm ridged areas are felt running parallel to the course of the muscle fibres. They, too, are tender and accompanied by pain over a wide area. These ridged areas are probably due to nerve irritation causing over-activity of the muscle fibres followed by replacement of the sarcoplasm by fibrous tissue and atrophy and degeneration from overaction.

This condition of fibrosis is sometimes due to disturbance of the intervertebral disk.

Quoting from Dr. Young's article, he states: "Take a patient with lumbago and inspect him in the standing position. If there is a lateral flexion deformity (that is, a sciatic scoliosis—a term which is better avoided, for this deformity may occur in the absence of sciatica), then the patient almost certainly has a protruded intervertebral disk."

I must join issue here on the grounds of inexactitude. Firstly, sciatic scoliosis—surely that term implies scoliosis *plus* sciatica. There are many types and causes of scoliosis without sciatica, and so it is not customary to refer to them as sciatic scoliosis as Dr. Young does here, although he does add an apologia: "only those in whom no deformity is visible are considered in this paper."

Secondly, if the mere fact that he has a scoliosis added to his lumbago makes the diagnosis of a protruded inter-

vertebral disk a certainty, then he obviously has not got lumbago, so it is rational to exclude these from the discussion. (Incidentally, if pain in the back *plus* scoliosis equals protruded intervertebral disk the diagnosis of back pain becomes extremely simple.) Admittedly Dr. Young excludes these cases from further discussion, but I thought a few comments thereon would not be out of place.

Dr. Young goes on to theorize on the action of the sacro-spinales in flexion and extension of the spine, but it is quite obvious from his remarks that he is dealing with normal muscles only and not with those affected by lumbago. In lumbago the sacro-spinales are acutely tender and the seat of inflammation—even in hyperextension they cannot relax ("cease to act"), hence his conclusion that "the pain which is felt on further extension of the spine cannot be due to muscular contraction" is, I consider, inaccurate, and in fact this is one of the signs which helps to differentiate lumbago from the many other causes of pain in the back—the nature, causation and site of the pain must all be very carefully analysed.

With regard to those cases in which injection of local anæsthetic into the (?) painful muscles does not abolish the pain there are obviously several fallacies. In acute lumbago the painful area may be widespread and a considerable area would require infiltration. Further, it is not always easy to localize and accurately inject all the painful nodules, and so one or more may escape and remain painful.

I question the accuracy of his statement that "Gowers's statement that the pain is felt only in contraction and extension of the muscles cannot therefore be substantiated by a careful consideration of the action of the lumbar muscles or the physical signs in a patient suffering from lumbago". This statement taken in conjunction with Dr. Young's preceding remarks convinces me that he is not discussing the same condition as was Gowers. In other words Dr. Young is discussing back pain due to discogenic disease and definitely not back pain due to acute lumbago.

He continues: "Evidence has already been presented to show that the pain of lumbago is not usually muscular in origin." This statement adds confirmation. There are a few further points which could be submitted. For example: (*a*) "One notes, however, that the maximum tenderness in lumbago is usually over the inter-spinous ligament." This is a differential diagnostic point against the diagnosis of lumbago where the painful "spot" is definitely the lumbar muscles or fascia or both. (*b*) "It is not well known that neck flexion and sciatic stretching sometimes cause pain in a patient suffering from lumbago." On the contrary these are two of the signs which help in the diagnosis of lumbago—the pain is caused by slight tension on the extremely sensitive lumbar fascia. (*c*) "Now lumbago is a common malady, and if it is due to disease of an interlaminar joint one would expect to find radiological evidence of disease of these joints." I would remind Dr. Young that radiological evidence of arthritis is a late arrival in the diagnostic field, as it obviously must be, since it is dependent upon bony changes, and further, it is extremely difficult to evaluate in the spinal joints. Spondylitis, that is, bony lipping of vertebral bodies, is not necessarily a sign of spinal arthritis, although it is usually present in advanced cases. This would account for the fact that Dr. Young has only seen it twice in his last 500 X-ray films.

I think I have quoted enough to substantiate my point. If anything further should be required it is contained in the last quarter of his paper in which he describes the nature of the pathological lesion in "lumbago"—a disk lesion.

Yours, etc.,

McKELLAR HALL, F.R.C.S.E., F.R.A.C.S.

224, St. George's Terrace,
Perth,
December 5, 1946.

THE TREATMENT OF BURNS.

SIR: I should like to suggest a simple and efficient treatment for burns which I have now used in private and hospital practice for the last twenty-five years on all types of burns and in all positions.

The history is, that a small boy was sent in to me from the outlying farm districts with second degree burns of the face. He had been annointed by his grandmother with white of egg which was powdered with cornflour. As he seemed comfortable I did not interfere with his lesion in any way and in ten days he returned home completely healed and without any scars.

For this I received great credit, and therefore felt that the treatment at least merited another trial. In any case of burns I anæsthetize with "Evipan Sodium" or ether, cleanse the area of all foreign substances, or loose skin or blisters with wool swabs saturated with ether and apply a single layer of gauze which has been drawn through egg albumen, flattening the gauze out gradually so that no air bubbles are present. This is allowed to dry, and the process is sometimes assisted by artificial heat.

If the original dressing adheres, as it usually does, it is left until it spontaneously peels off, all loose pieces being snipped away with sharp scissors and no further dressings applied. Any moisture appearing through the dressing is powdered twice daily with oleate of zinc and no attempt is made to evacuate any exudate which may collect beneath the gauze.

Of late I have been dusting the raw burnt surfaces with penicillin and sulphanilamide before application of the albumen, but do not consider this to be necessary, as it is only a balm to my conscience and not to the patient. I have no complaints made to me of pain and very seldom have I had to use a sedative.

In twenty-five years I have not had to use a skin graft, except in two cases, and these were due to the patients concerned interfering with the artificial scab. I cannot quote actual figures, but the fact that I have discarded, after a short trial, all other treatments recommended, seems to me sufficient that this method is well worth a trial, the materials being always available and the patient's feelings being taken into consideration.

Yours, etc.,

G. P. ARNOLD.

Windsor,
New South Wales,
December 10, 1946.

MOTOR-CAR ALLOWANCE FOR THE LOCUM TENENS.

SIR: The present high purchase price of motor vehicles coupled with excessive maintenance costs, make an early review of *locum tenens* allowance necessary.

The present rate of two guineas per week, *plus* petrol and oil, does not in many cases pay for the running costs of the vehicle, let alone leave a margin for depreciation and interest on the capital involved.

Figures published recently in the *Autocar*, official organ of the Royal Automobile Club of Victoria, estimate running costs at between 5d. and 6d. per mile, depending upon the size of the car. Assuming 150 miles as the weekly mileage, and 25 miles per gallon, the present fee gives a little over 4·5d. per mile, with 200 miles 3·5d., with 300 miles a little under 2·5d. is attained, and this mileage is by no means excessive in a busy practice.

I consider that the payment for the use of the car should be on a mileage basis, as this is fair to both parties. The minimum rate should be 7d. per mile with an increased allowance for difficult conditions.

Yours, etc.,

December 9, 1946. LOCUM TENENS.

Obituary.

AUGUSTUS LEO KENNY.

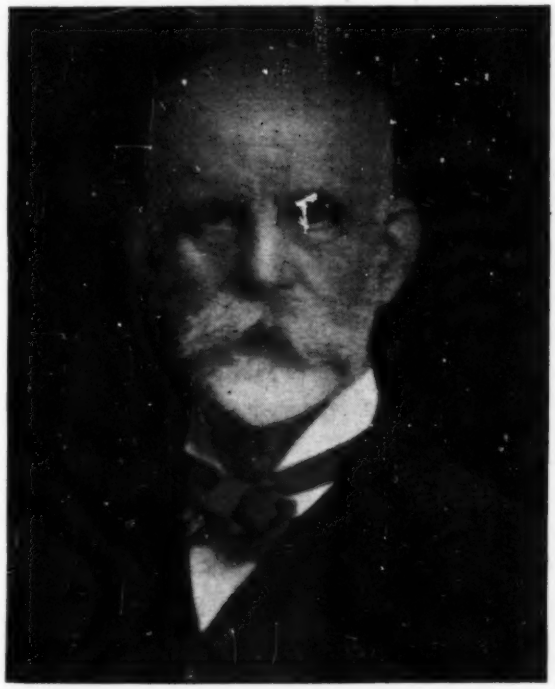
WE are indebted to Dr. J. P. Major for the following appreciation of the late Dr. Augustus Leo Kenny.

By the death of Augustus Leo Kenny the profession has lost not only a man very eminent in his chosen sphere of work—ophthalmology—but one who had given great service over many years to the welfare of the British Medical Association. Born in Manchester, England, in 1863, he arrived in Melbourne in 1870 and his school days were spent at Saint Patrick's and Xavier Colleges, Melbourne. In 1885 he graduated M.B., B.S., at the University of Melbourne. Very early in his professional career he went abroad for post-graduate study in eye diseases, but while in the East he became very interested in tropical medicine, and it is certain that his residentship at the Melbourne Eye and Ear Hospital was the deciding factor in the ultimate choice of his speciality. It was about this period that he acquired great facility in the operation for cataract, having trained himself to be ambidextrous. Later he was honorary oculist to Saint Vincent's Hospital, a position from which he resigned to devote himself to a large consulting and operating practice in eye diseases. In this field he was recognized as one of Melbourne's leaders until 1941, when for health reasons he was forced to curtail his activities drastically.

Dr. Kenny joined the Medical Society of Victoria and was its president in 1899. After the amalgamation of the society

and the Victorian Branch of the British Medical Association he became a member of the Branch Council, remaining so for very many years; he was elected president in 1914. This year, 1914, was the jubilee year of the University of Melbourne Medical School, and Dr. Kenny played an active part in the proceedings as well as being chosen to propose the toast of "Our Guests" at the jubilee dinner, a task he fulfilled most ably, for he was a gifted speaker. By a coincidence it was at my request that it was agreed that he should be invited to and did propose the same toast at the annual dinner of the Association when the British Medical Association held its annual meeting in Melbourne in 1935.

In 1923 Dr. Kenny was very successful as Honorary General Secretary of the first session of the Australasian Medical Congress (British Medical Association) held in Melbourne, and when the Royal Australasian College of Surgeons was constituted he became one of its Fellows.



I saw a great deal of him as a member of the Victorian Branch Council, and one could not but be impressed by his clear thinking and speaking and his unfailing courtesy. He was a man of fine presence and character and all the above qualities, together with a definite sense of humour, made him a most valuable councillor for whom all had very great esteem and regard. During the two years of preparation for the 1935 annual meeting of the British Medical Association I sought his advice unofficially about matters of organization on several occasions, and the advice was always sound and most generously given. The following resolution has been adopted by the Council of the Victorian Branch of the British Medical Association:

> The Council of the Victorian Branch of the British Medical Association records with regret the death of Augustus Leo Kenny, C.B.E., K.G.C.S.G., K.S.G., M.B., Ch.B., F.R.A.C.S., who, as President of the Medical Society of Victoria in 1899, a member of the Council of the Victorian Branch of the British Medical Association for many years and its President in 1914, and Honorary General Secretary of the Australasian Medical Congress of 1923, rendered distinguished service to the Medical profession in Victoria. The Council extends its sympathy to his family.

For his public services His Majesty the King in 1938 honoured him by creating him C.B.E.

Dr. Kenny was a very prominent layman of the Roman Catholic Church, and I and other colleagues frequently saw him on his daily walk from his rooms to Saint Patrick's Cathedral. During a visit to Rome he served as Papal Chamberlain and was decorated by two popes—the Knighthood of St. Gregory being conferred in 1888 and the Grand Cross of the same Order in 1927.

In his early days he was a keen oarsman, cricketer and a fine horseman, his interest in cricket never ceasing, for his was a well-known figure in latter years at most important matches at the Melbourne Cricket Club ground. He also was no mean pianist, and throughout life was particularly interested in music, painting and sculpture. It was during a world tour with some stay in Persia that he studied Persian art generally and Persian rugmaking, and on his return to Melbourne gave several lectures illustrated by lantern slides on this subject. He married in 1912 Miss Olga Ziehy-Woinarski, a noted violinist, who predeceased him. They had two sons and two daughters, one of the latter—Elizabeth—becoming a member of the medical profession. To them we extend our deepest sympathy.

Mr. D. H. Rankin, Honorary Secretary of the Melbourne Shakespeare Society, writes:

The death of Dr. A. L. Kenny at eighty-three has removed one of the luminaries of our civic capital. For over half a century the Victorian people associated his name with medical skill, artistic knowledge, scholarly tastes and accomplished circles. Dr. Kenny, in a definite manner and for a long time, was the "guide, philosopher and friend" for an army of friends, clients and religious, who figured on his professional roll.

To his consulting rooms at the top of Collins Street he gave his undivided attention for half a century; finally, failing health compelled him to retire and leave the surgery, the medical data and the manifold charts associated with a great medico's long lifetime.

In his day Dr. Kenny was an excellent lecturer. In conversation he displayed a retentive memory and an historical sense. He never feared new ideas, nor was he afraid of new movements. He tried to ascertain the best thought that had been expressed through the arts. He clearly showed ability to recognize and enjoy the beautiful in nature.

Dr. Kenny also excelled in that he was a beacon for the many, a refined gentleman, a scholar of accomplishments, with a scientific outlook; a man of social tact, a charming companion, possessing noble ideals and literary tastes; finally, a practical Catholic whose piety found countless channels of expression.

Most of the doctor's contemporaries predeceased him, and those who knew him at his best, had they been alive, would have paid high tribute to his name and his prestige.

He whose dawn had been so glorious, whose maturity had attained so much, and had reached to heights where few figure, did not enjoy the sunset that gives to age its charm and to the octogenarian his peculiar philosophy. The great doctor who had helped so many for the last two or three years of his life was unable to help himself. Loving hands and human angels looked after him during his illness. But almost to the end their patient's light shone with the radiance of that spiritual fire that had characterized him through life and made him the man that he was.

WILLIAM ROY WILSON.

We regret to announce the death of Dr. William Roy Wilson, which occurred on November 25, 1946, at Southport, Queensland.

STEWART OSBURN COWEN.

We regret to announce the death of Dr. Stewart Osburn Cowen, which occurred on November 29, 1946, at Melbourne.

ALBERT ARSCOTT PAIN.

We regret to announce the death of Dr. Albert Arscott Pain, which occurred on December 6, 1946, at North Strathfield, New South Wales.

JAMES ADOLPH GRUEN.

We regret to announce the death of Dr. James Adolph Gruen, which occurred on December 8, 1946, at Sydney.

The Royal Australasian College of Surgeons.

PRIMARY FELLOWSHIP EXAMINATION.

THE next meeting of the Court of Examiners for the primary examination for Fellowship of the Royal Australasian College of Surgeons will be held in New Zealand probably early in June, 1947.

The next meeting of the Court of Examiners for the final examination for Fellowship of the College will be held at the College in Melbourne in June, 1947.

Candidates who desire to present themselves at either of these meetings should apply to the Censor-in-Chief for permission to do so on or before April 1, 1947. The appropriate forms are available from the Secretary of the Royal Australasian College of Surgeons, Spring Street, Melbourne.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as duly qualified medical practitioners:

Duncan, Jewel Shirley Esther, M.B., B.S., 1946 (Univ. Sydney), Tamworth Base Hospital, New South Wales.

Dunlop, Donald Buzzard, M.B., B.S., 1946 (Univ. Sydney), Royal South Sydney Hospital, Zetland.

Farrar, John Frederick, M.B., B.S., 1946 (Univ. Sydney), Ryde District Soldiers' Memorial Hospital, Eastwood.

Finckh, Ernest Sydney, M.B., B.S., 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Finckh, Gertrude Dorothea, M.B., B.S., 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Freeman, Jessie Strahorn, M.B., B.S., 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Frith, Bruce Austin, M.B., B.S., 1946 (Univ. Sydney), Sydney Hospital, Sydney.

Garven, Alison Kinnear, M.B., B.S., 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Gilmour, William Norman, M.B., B.S., 1946 (Univ. Sydney), Sydney Hospital, Sydney.

Nominations and Elections.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Constable, Roy Keith, M.B., B.S., 1937 (Univ. Sydney), Belgrave Street, Kempsey.

Daymond, Keith Robertson, M.B., B.S., 1946 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Gilmour, William Norman, M.B., B.S., 1946 (Univ. Sydney), Sydney Hospital, Sydney.

Hollywood, Thomas Desmond, M.B., 1942 (Univ. Sydney), "Cloughmore", High Street, West Maitland.

Howarth, Vernon Stuart, M.B., B.S., 1939 (Univ. Sydney), 20, Hodgson Avenue, Cremorne.

L'Estrange, James Michael, M.B., B.S., 1944 (Univ. Sydney), NX208038 Captain, 28 Aust. Camp Hospital, Tatuna, Victoria.

Manning, Ian Garnet, M.R.C.S., 1945 (England), L.R.C.P., 1945 (London), 189, Macquarie Street, Sydney.

Muller, John William, M.B., B.S., 1943 (Univ. Sydney), Swift Street, Wellington.

Murphy, John Denis, M.B., B.S., 1945 (Univ. Sydney), "Fairfield House", Vine Street, Fairfield.

Oakley, Donald Waterhouse, M.B., B.S., 1941 (Univ. Sydney), 1, Glamis Flats, Ocean Avenue, Edgecliff.

Oxenham, Brian Bede, M.B., 1942 (Univ. Sydney), 766, New South Head Road, Rose Bay.

Pedersen, Peder Nielsen, M.B., Ch.B., 1910 (Edinburgh), F.R.C.S., 1922 (Edinburgh), 4, Whaling Road, North Sydney.

Siedlecky, Josephine Ursula, M.B., B.S., 1946 (Univ. Sydney), Rachel Forster Hospital, Pitt Street, Redfern.

Saunders, Humphery St. John, M.B., B.S., 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Books Received.

"Practical Malariology", prepared under the auspices of the Division of Medical Sciences of the National Research Council by Paul F. Russell, M.D., M.P.H., Luther S. West, Ph.D., and Reginald D. Manwell, Sc.D., with a foreword by Raymond B. Fosdick; 1946. Philadelphia, London: W. B. Saunders Company; Melbourne: W. Ramsay (Surgical) Proprietary Limited. 9¼" × 6", pp. 704, with many illustrations. Price: 60s.

"R K G Rheocardiography: A Method of Circulation's Investigation and Diagnosis in Circular Motion", by W. Holzer, K. Polzer and A. Marko; authorized English translation by Mrs. Emma M. Kreidl, Vienna; 1946. Vienna: Wilhelm Maudrich. 9¼" × 6", pp. 52, with 44 illustrations.

"Practical Anatomy", revised and rewritten by W. E. LeGros Clark, M.A., D.Sc., F.R.S., F.R.C.S.; 1946. London: Edward Arnold and Company. 8¼" × 5¼", pp. 486, with many illustrations. Price: 25s.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.

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THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—33RD YEAR. SYDNEY, SATURDAY, DECEMBER 28, 1946. No. 26.

COMMONWEALTH OF AUSTRALIA. DEPARTMENT OF HEALTH.

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This ointment must not be confused with the recently announced "Ointment of Penicillin, B.P.", as the base is of different composition, being specially prepared to yield an oil-in-water type of emulsion for use on weeping surfaces.

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APPOINTMENT OF ASSISTANT EDITOR

The Directors of the Australasian Medical Publishing Company, Limited, wish to appoint an Assistant to the Editor of THE MEDICAL JOURNAL OF AUSTRALIA.

If possible, they wish to make a full-time appointment; failing this a half-time appointment may be made. In any case the appointee will be asked to serve a three months' probationary period.

Applicants should state whether they have had any experience in literary work and should give details of their undergraduate studies, of their experience in medical practice and of service with His Majesty's Forces. Applicants should preferably be about 35 years of age. The successful applicant will be expected after a probationary period to declare his intention to adopt medical journalism as a career. The salary offered will be £900 *per annum* for a full-time appointment. Should a half-time appointment be made, the remuneration offered will be £500 *per annum*. Applications, which will close on January 31, 1947, should be sent to the Secretary of the Australasian Medical Publishing Company, Limited, The Printing House, Seamer Street, Glebe, New South Wales.

LIDCOMBE STATE HOSPITAL, LIDCOMBE.—Applications are invited from medical practitioners for the undermentioned positions at Lidcombe State Hospital: (1) Honorary Physician; (2) Honorary Dermatologist. Appointments will be for a period of five years. Applications should reach the undersigned on or before 6th January, 1947.—E. SYDNEY MORRIS, Director-General of Public Health, 52 Bridge Street, Sydney.

FOR SALE, 35 mm. Tunnel Unit with 1·5 contax camera mounted on counter-weighted 4 post stand or alternatively mounted on KelyKoet 2 post stand, both with provision for holding 17 x 14 cassettes, complete with screen. This equipment may be inspected at the Anti-Tuberculosis Association's Clinic, 169 Albion Street, Surry Hills. 'Phone: FA 5859.

TERRITORY OF PAPUA-NEW GUINEA: VACANCIES FOR MEDICAL OFFICERS. — Applications are invited from persons desirous of appointment as Medical Officer in the Public Service of the Territory of Papua-New Guinea.

Salary £1,000 per annum. (Advancement beyond £1,000 per annum will be determined as a result of an investigation that is now proceeding.) The Income Tax Assessment Act does not apply to any income derived by a resident of the Territory from sources within the Territory.

Appointment will be either for a specified term of two years or on probation with a view to permanent appointment.

The headquarters of the Administration are at present at Port Moresby, but appointees will be required to serve in any part of Papua-New Guinea.

After twenty-one months' service in the Territory appointees will be eligible for three months' leave of absence on full pay.

Applications, accompanied by copies only of testimonials setting out date of birth, full name, qualifications and experience, and stating whether married or single, should reach the Secretary, Department of External Territories, Canberra, on or before the 31st January, 1947.

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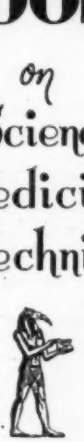

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